United States Department of the Interior
NATIONAL PARK SERVICE
Air Resources Division
P.O. Box 25287
Denver, CO 80225

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IN REPLY REFER TO:

February 25, 2010

N3615 (2350)

Mr. Brian Gustafson
Administrator, Air Quality Program
South Dakota Department of Environment and Natural Resources
523 E Capitol
Pierre, SD 57501

Dear Mr. Gustafson:

On January 15, 2010, we received South Dakota's draft regional haze implementation plan for review. We appreciate the opportunity to work closely with the State through the development and review of this plan. Cooperative efforts such as these ensure that, together, we will continue to make progress toward achieving natural visibility conditions at our National Parks and Wilderness Areas.

This letter acknowledges that the U.S. Department of the Interior, National Park Service (NPS), in consultation with the U.S. Fish and Wildlife Service, has received and conducted a substantive review of the South Dakota draft Regional Haze Rule implementation plan in fulfillment of your requirements under the federal regulations 40 CFR 51.308(i)(2). Please note, however, that only the U.S. Environmental Protection Agency (EPA) can make a final determination regarding the document's completeness and, therefore, ability to receive federal approval from EPA.

As outlined in a letter to each State dated August 1, 2006, our review focused on eight basic content areas. The content areas reflect priorities for the Federal Land Manager agencies, and we have enclosed comments associated with these priorities. Overall the draft implementation plan was well organized and addressed most of the key elements outlined in our letter. We are very pleased to see South Dakota's commitment to semi-dry flue gas desulfurization for sulfur dioxide (SO_2) controls and selective catalytic reduction for nitrogen oxide controls as best available retrofit technology for the Otter Tail Big Stone Unit 1 coal-fired power plant. However, we have two primary concerns with the draft plan: 1) the reasonable progress analyses should include a four factor analysis of potential controls on SO_2 emissions from point and areas sources, and 2) the long-term strategy should provide more discussion of activities to reduce smoke impacts from fires and to reduce fugitive dust from construction and road projects.

We look forward to your response, as per section 40 CFR 51.308(i)(3). For further information regarding our comments, please contact Pat Brewer of my staff, at (303) 969-2153.

Again, we appreciate the opportunity to work closely with the State of South Dakota and compliment you on your hard work and dedication to significant improvement in visibility in our Class I national parks and wilderness areas.

Sincerely,

John Bunyak
for Christine L. Shaver
Chief, Air Resources Division

Enclosure

Cc: Gail Fallon
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US EPA Region 8
1595 Wynkoop Street
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National Park Service Comments
South Dakota Draft State Implementation Plan for Regional Haze
February 25, 2010

General Comments

South Dakota's draft State Implementation Plan (SIP) is well organized and addresses most of the key elements of a regional haze SIP as outlined in our August 2006 letter to the states. South Dakota has defined current and natural visibility conditions and has applied technical analyses provided by the Western Regional Air Partnership (WRAP) to describe emissions inventories, state and source sector contributions to haze at Class I areas, and visibility response to expected emissions controls by 2018. SD has proposed controls for the Otter Tail Big Stone electric generating plant under Best Available Retrofit Technology (BART). We are pleased to see these substantive reductions of sulfur dioxide (SO_2) and nitrogen oxide (NO_x) emissions. SD has defined reasonable progress goals and addressed a long-term strategy to improve visibility in SD Class I areas. We would like to see a more developed four factor analysis of emissions control options, but overall SD has demonstrated a commitment to protecting visibility in our national parks and wilderness areas.

Specific Comments

Please add footnotes to the tables and graphs throughout the document to define the abbreviations used, especially for organic carbon mass, particulate organic aerosol, elemental carbon, and fine mass elemental carbon. The terms vary depending on the data source used and can be confusing to the reader.

Chapter 3 Baseline, Natural and Uniform Rate of Improvement

As stated on page 12, EPA's guidance on determining natural conditions provides default assumptions for natural background visibility and allows states to refine estimates. For Class I areas in and near SD, the greatest uncertainty is related to the contributions of organic carbon and elemental carbon from natural wildland fires. SD's revisions to fine soil and coarse matter assumptions are based on 2000-2004 IMPROVE monitoring and effectively suggest that natural background should be lower than the default assumption. This revision would require even greater reductions in current anthropogenic sources of fine soil and coarse matter to achieve the revised natural background conditions. Given the large uncertainties, we recommend that SD retain EPA's default assumptions using natural background values available on the VIEWS website for this current SIP and defer refinements to a later SIP.

Chapter 4 IMPROVE Data for Class I Areas

Chapter 4 describes the IMPROVE data used as the current baseline visibility. Contributions of aerosol components to the 20% least and the 20% most impaired days are informative for developing priorities for emissions reductions. Page 21, second paragraph, and page 26, second paragraph, refer to combustion of organic mass in forest fires and grasslands as a source of ammonium sulfate. Fires are actually an insignificant contribution to ammonium sulfate compared to fossil fuel combustion (see Table 5-1 SO_2 emissions by source sector), and we recommend that you delete the references to fires as a source of ammonium sulfate.

Wildland fires are major contributors to organic carbon and elemental carbon, and we recommend that you expand the analysis of the contribution of wildfire to visibility impairment at the SD Class I areas. Tables 4.1 and 4.2 indicate that for both Badlands and Wind Cave National Parks (NPs), on the 20% worst days, organic carbon mass (OCM) is greater than ammonium sulfate mass. In addition to the averages of the 20% least and 20% most impaired days and quarterly averages, if you look at the aerosol contributions on individual days during the 2000-2004 baseline period, you could identify frequency of elevated organic and elemental carbon that could indicate fire impacts. It is likely that OCM from fires dominates aerosol concentrations on some 20% worst days. Back trajectory analyses could assist in defining source areas for exceptional fire events such as referenced for July 2, 2008, and October 25, 2005, and could assist separating impacts from local agricultural or prescribed fires that might be controllable from major wildland fires. Considering aerosol composition on individual days will also assist in assessing the relative contributions from other sources (fossil fuel combustion, biogenic, etc).

On page 25, SD concludes, based on the similarity in aerosol composition between Badlands and Wind Cave NPs, that it is reasonable to assume that the contribution to visibility impairment on the 20% best days is not being impacted by local sources. It is likely that the neighboring parks are influenced by similar sources, but the data do not support the conclusion that local sources are not contributing. Please rephrase this statement.

On page 33, second paragraph should indicate that visibility impairment appears to be declining (rather than visibility declining).

The visibility trends data presented in Figures 4-7 and 4-8 are helpful. Looking at similar time series plots for the individual aerosol components would illustrate whether sulfate and nitrate, those components dominated by anthropogenic, controllable, sources, are declining more than OCM, an indicator of fire. Figure 4-8-a uses a narrow scale for the y axis (14 to 17 dv), different from the other plots in the series (0-25 dv). This compressed scale gives the impression of a much larger change in dv than if the full scale were presented. By looking at individual aerosol components, SD could better understand the contributions to this trend in total aerosol extinction.

Section 5.0 Source Apportionment

Section 5.1 discusses SD's emissions inventory, which relies on well documented WRAP analyses. In Tables 5-1 and 5-2, 2002 SO_2 emissions from SD area sources drop from 10,159 tons/yr to 1,071 tons/yr. WRAP documentation of differences between the WRAP 2002 Base 2002b and 2002d inventories includes revisions to SD area source categories. Please clarify the basis for the revised area source estimate. Were some SD area source categories reclassified as point sources?

It would be helpful to understand the contribution from Big Stone Unit 1 to 2002 total point source SO_2 and NO_x emissions. In Table 5-2, 2002d South Dakota Emissions Inventory, please list the SO_2 and NO_x emissions from Big Stone 1 separately from the other point sources. This will make it easier to compare data in Table 5-2 to Table 5-4, 2018 SD Emissions, Table 6.1, Emissions from BART-eligible sources, and Table 6-3 WRAP Modeling Results for Big Stone Unit 1.

The 2018 point source emissions in Table 5-4 include emissions from planned new facilities; two of these (Big Stone II and Basin Electric's NextGen) are now on hold. These two facilities represent 45% of total SO_2 point source emissions and 15% of total NO_x point source emissions in 2018. These facilities may become operational by 2018 so it is appropriate that WRAP modeling results accounted for new generation by 2018. Separate from this regional haze SIP, we received notice of a Draft Environmental Impact Statement for a proposed new 300 megawatt natural gas-fired, combined-cycle electric generating facility in eastern South Dakota. The emissions from this proposed new facility were not included in this SIP emissions discussion nor in the WRAP 2018 emissions projections.

In addition to the four electric generating units listed in Table 5-4, all other point sources together are projected to emit 2458 tons SO_2/year in 2018. Area sources are projected to contribute another 1662 tons/yr. In Section 7 under the reasonable progress analysis, these emissions should be assessed to determine if there are reasonable control measures.

Tables 5-6 and 5-7 are helpful in illustrating SD's emissions relative to neighboring states.

Section 5.2 discusses Source Apportionment Analyses. WRAP PSAT analyses (Figure 5-1) project that point sources dominate contributions to sulfate at the SD Class I areas. Neighboring states of WY and ND have a greater contribution to sulfate at the SD Class I areas on the 20% worst days than SD point sources. SD area sources are as important as SD point sources, suggesting that emissions controls for area sources could have measureable benefits at the Class I areas. WRAP Weighted Emissions Potential (WEP) analyses indicate that SD is the largest contributor to organic carbon, elemental carbon, and coarse mass at the SD Class I areas. Natural fires in SD dominate the organic carbon contributions. WRAP PSAT analyses indicate that SD's contribution to nitrate is intermediate between that for sulfate and organic carbon. These analyses support SD's focus on reducing anthropogenic SO_2 and NO_x emissions and also encourage managing fire, agriculture, and construction activities to minimize emissions.

Section 6: Best Available Retrofit Technology (BART)

The SD BART analysis is one of the best that we have reviewed to date; the discussion is thorough and informative. The National Park Service (NPS) is very pleased and commends SD for concluding that for Otter Tail Big Stone 1 power plant, the best available retrofit technologies are semi-dry flue gas desulfurization for SO_2 and selective catalytic reduction (SCR) for NO_x. There are still a few areas where we offer additional suggestions:

6.3.2.3 Sulfur Dioxide Control Effectiveness

SD evaluated the control effectiveness by comparing the effectiveness in Table 6.6.
NPS: SD should state the control effectiveness and resulting emission rate that it believes to be appropriate for each control technology option. For example, it appears that SD has concluded that a semi-dry scrubber can achieve 90% SO_2 control. We agree with SD's analysis, but suggest that the baseline for annual SO_2 emissions should reflect anticipated uncontrolled annual emissions which, according to EPA's Clean Air Market Database, have averaged 0.66 lb/mmBtu (range 0.63 - 0.70) over the 2000 – 2008 period.

6.3.2.4 Sulfur Dioxide Control Technology Impacts

SD: Otter Tail Power Company identified cost estimates for each of the control options. In addition, Otter Tail Power Company identified cost estimated for two different operating scenarios for each of the two control alternatives. Table 6-7 summarizes Otter Tail Power Company's estimated costs.
Otter Tail: Cost estimates for the wet and semi-dry (including SDA and fabric filter) SO_2 control technologies were completed utilizing the Coal Utility Environmental Cost (CUECost) computer model (Version 1.0). The model was run with 2008 designated as the cost basis year because equipment cost estimating in the model is based on the Chemical Engineering Cost Index and the composite 2008 index is the latest version available. Following completion of the estimating on a 2008 cost basis year, all costs were escalated to a 2009 basis year utilizing the inflation rates designated in Table 1.2-3.
NPS: Otter Tail should have used the EPA Control Cost Manual as advised by the BART Guidelines and by EPA Region 8. Otter Tail should at least have provided its CUECost output data.

6.3.3.3 Nitrogen Oxide Control Effectiveness

SD: Step 3 requires the evaluation of control effectiveness for each control technology. SD evaluated the control effectiveness by comparing the effectiveness in Table 6.9.
NPS: SD should state the control effectiveness and resulting emission rate that it believes to be appropriate for each control technology option. For example, it appears that SD has concluded that SOFA+SCR can achieve 88% NO_x control. However, if SOFA can reduce NO_x emissions to 0.50 lb/mmBtu, then it is reasonable to expect that addition of SCR would reduce NO_x emissions by another 90% or down to 0.05 lb/mmBtu on an annual average. For example, the Illinois EPA has proposed that the two cyclone boilers firing PRB coal at Dominion Energy's Kincaid Generating Station should achieve 0.07 lb/mmBtu on an annual basis with over-fire air (OFA) and SCR. (Please see 02/16/2010 email from Don Shepherd to Kyrik Rombough for Excel spreadsheet of NO_x performance at Kincaid.) To meet that limit, the Kincaid SCRs would reduce inlet NO_x emission by slightly over 89%. It should be feasible for Big Stone #1 to achieve a lower limit because of the superior initial NO_x reductions that can be achieved with SOFA versus the OFA at Kincaid. We suggest that, to allow for some operational flexibility, a 30-day rolling average limit of 0.06 lb/mmBtu would be appropriate for Big Stone #1 if equipped with current-technology SOFA+SCR.

6.3.3.4 Nitrogen Oxide Control Technology Impacts

SD: Otter Tail Power Company identified cost estimates for five control options. Table 6-10 summarizes Otter Tail Power Company's estimated costs.
NPS: Otter Tail has applied a generalized "unit cost factor" of $172/kW to estimate a Total Capital Investment (TCI) of $81.8 million for SOFA+SCR. Applying the recommended EPA Control Cost Manual results in a TCI of $44.3 million. Otter Tail has estimated O&M costs at $4.1 million versus our $2.4 million estimate from application of the Cost Manual methods. Otter Tail has estimated a Total Annual Cost of $13.2 million to achieve 0.10 lb/mmBtu with a cost-effectiveness of $825/ton. Our Cost manual approach estimates a Total Annual Cost of $6.8 million to achieve 0.05 lb/mmBtu on an annual basis with a cost-effectiveness of $493/ton.

6.3.5.2 Sulfur Dioxide BART Recommendation
SD: As noted in Table 6-16, "approximately 40 percent of the modeling, the top ranked control option generated a higher visibility impact than the second ranked control option. Whereas, approximately 60 percent of the modeling, the second ranked control option generated a higher visibility impact than the top ranked control option. Therefore, based on the visibility modeling there is no discernable difference between these two control options. As such, SD considers that the semi-dry flue gas desulfurization system is considered BART....SD considers the emission limit representing BART should be 505 pounds per hour, which would include periods of startup and shutdown and 0.09 pounds per million Btus, which would not include startup and shutdown. Compliance with these emission limits should be based on the continuous emission monitoring system and on a 30-day rolling average."
NPS: Based upon the data presented by Otter Tail and summarized by SD, we agree that the difference between wet and dry scrubbing is not sufficient to justify the additional costs and impacts of wet scrubbing.

6.3.5.3 Nitrogen Oxide BART Recommendation
SD proposes a BART emission limit for NO_x of 561 pounds per hour, "which would include periods of startup and shutdown and 0.10 pounds per million Btus, which would not include startup and shutdown periods. Compliance with the emission limits would be based on the continuous emission monitoring system and on a 30-day rolling average."
NPS: We believe that the Kincaid cyclone boilers in Illinois (described above) have demonstrated the ability of SCR to reduce NO_x emissions below the limit proposed by SD. We suggest that, to allow for some operational flexibility, a 30-day rolling average limit of 0.06 lb/mmBtu would be appropriate for Big Stone #1 if equipped with current-technology SOFA+SCR.

Please clarify emissions assumptions used for the WRAP regional modeling compared to those used in the Big Stone Unit 1 BART modeling. Emissions used in Tables 5-2, 5-4, 6-1, and 6-3 do not appear to be consistent, likely because they are based on different assumptions. Does Table 6-1 refer to potential emissions, not annual emissions? If so, please clarify. Table 6.1 lists Big Stone Unit 1 SO_2 emissions as 19,363 tons and NO_x emissions as 17,179 tons. Table 5-2 indicates 14,022 tons of SO_2 and 20,697 tons of NO_x from all point sources in 2002. Does Table 6-3 refer to potential emissions? In Table 6-3 WRAP BART modeling results are based on an assumption that Big Stone Unit 1 emits 12,409 tons SO_2 and 15,580 tons of NO_x, or 88% and 75% of all SD point source SO_2 and NO_x emissions in 2002. Is this correct? Did SD include assumptions for BART controls for Big Stone Unit 1 in the WRAP 2018PRP18b regional modeling? In Table 5-4 Big Stone Unit 1is projected to emit 3,425 tons SO_2 in 2018, 18% of the value in Table 6-1 or 28% of the value in Table 6-3. How does this relate to the 90% control efficiency listed for dry scrubbing in Table 6-6? In Table 5-4 Big Stone Unit 1 NO_x emissions in 2018 (15,580 tons) appear to be the same as used as the baseline for the BART analysis reported in Table 6-3. Does this mean that WRAP regional modeling assumed SO_2 controls but not NO_x controls for Big Stone Unit 1? Please clarify.

We appreciate that SD included in Table 6-15 the costs per deciview visibility improvement for each control option and each Class I area. To demonstrate the cumulative benefits of improving visibility at all impacted Class I areas, we recommend that SD provide an additional table that illustrates the cumulative $/dv for these control options.

Section 7: Reasonable Progress

This section includes most but not all the basic components of a reasonable progress analysis. SD should state explicitly that the reasonable progress goals for SD Class I areas are the same as the WRAP CMAQ modeling results for 2018 and that SD did not include any other emissions reductions beyond those modeled by the WRAP in setting the reasonable progress goals. Because modeled progress in improving visibility by 2018 is less than the uniform rate of progress necessary to achieve natural visibility conditions by 2064, SD needs to define when natural conditions are expected to be achieved given the reasonable progress goals by 2018.

SD's discussion is missing the required four factor analysis of potential emissions controls. SD has correctly identified SO_2 as a major contributor to visibility impairment. SO_2 emissions from SD point and area sources should be evaluated to determine if there are cost-effective control options. The regional haze rule requires SD to evaluate four factors in considering potential emissions controls to improve visibility:

1) Cost of compliance
2) Time necessary for compliance
3) Energy and non-air quality environmental impacts of compliance
4) Remaining useful life of the source considering controls

In 2009, WRAP contractors (EC/R, Inc.) delivered a general four factor analysis for SO_2 and NO_x control options for major industrial and utility source sectors[1]. SD should characterize the major sources or source categories in the SD SO_2 inventory and apply the four factor information provided by WRAP for relevant sources or source categories to discuss what controls might be feasible (e.g., coal-fired industrial boilers). Reviewing SD Title V permits would assist defining

[1] http://www.wrapair.org/forums/iwg/docs.html.

whether a few large sources dominate the SO_2 inventory and whether controls are cost effective for these sources. For example, switching to a fuel oil with lower sulfur content might reduce SO_2 emissions from point or areas sources at relatively low cost. SD should also discuss options to reduce anthropogenic emissions of organic carbon (including reference to later discussion of smoke management practices).

Section 8: Long-term strategy

SD has addressed the major elements of a long-term strategy. We would like to see more complete discussion of local options to address emissions of organic carbon mass, elemental carbon, and course mass. Because WRAP source apportionment analyses indicate that organic carbon from natural fires is a major contributor to impairment on the 20% most impaired days, SD needs to provide a more complete discussion of options to control smoke from unplanned wildland fires and the relative importance of prescribed burns and agricultural burning in the state. SD stated on page 110 that agricultural burning occurs in the eastern part of the state but that does not preclude transport of smoke to the west on some days. SD is encouraged to develop a smoke management plans for prescribed burns options. We appreciate that emissions from prescribed burns in the national parks are contributing to visibility impairment. We are available to assist the parks and SD in developing effective smoke management plans.

SD references an existing regulation that limits fugitive emissions from state facilities in Rapid City. As part of the long-term strategy SD should consider expanding regulations that require public and private construction and road projects to limit fugitive dust emissions.

SD could commit in this SIP to pursuing these activities as part of the long-term strategy.

Section 9: Monitoring Strategy

We commend SD for maintaining SO_2, NO_x, Ozone, $PM_{2.5}$, PM_{10}, and meteorological measurements next to the IMPROVE sites at Badlands and Wind Cave NPs. These data will assist SD in evaluating source contributions to air quality and visibility in these Class I areas.

Section 10: Consultation Requirements

The Federal Land Managers appreciate this opportunity to consult with SD. WRAP has facilitated coordination and consultation among the WRAP states. We encourage SD to discuss directly with the neighboring states the planned controls and the contributions from neighboring states to SD Class I areas.

We look forward to continuing to work with SD to protect visibility in our Class I areas.