west virginia department of environmental protection

West Virginia
State Implementation Plan Revision:
Regional Haze 5-Year Periodic Report
(Covering 2008-2013)
Describing Progress Towards the Reasonable Progress Goals for Visibility in Class I Federal Areas
and
Determination of Adequacy of Existing Implementation Plan

PROPOSED
March 2013

Promoting a healthy environment.

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Executive Summary

The Clean Air Act mandates requirements to protect visibility, especially in Class I Federal Areas. In 1999, the U.S. Environmental Protection Agency (EPA) finalized the Regional Haze Rule (RHR) [66 FR 35714]. The rule calls for state, tribal and federal agencies to work together to improve visibility in 156 national parks and wilderness areas, including the 21 Class I areas.

States are required to develop and implement air quality protection plans (State Implementation Plans, or SIPs) to reduce pollution that causes visibility impairment. These plans establish goals and emission reduction strategies based on trends from various sources, including area source emissions, mobile source emissions (both on-road and non-road emissions), biogenic emissions, and wildfire and agricultural emissions.

In developing its SIP (submitted to EPA on June 18, 2008), West Virginia prepared a long-term strategy and examined the possible application of Best Available Retrofit Technology (BART) in order to establish reasonable progress goals for Dolly Sods and Otter Creek. The predicted reductions in visibility impairment were expected to result from implementation of existing and planned emission control programs. This document is intended to address the requirements of 40 CFR 51.308(g) requiring periodic reports evaluating progress goals toward reasonable progress goals (RPGs).

Ammonium sulfate is the largest contributor to visibility impairment at Dolly Sods and Otter Creek and reduction of sulfur dioxide (SO_2) emissions is the most effective means of reducing ammonium sulfate. As such, the majority of the focus with regard to existing and planned emission controls pertains to the largest sources of SO_2 emissions. These sources consist of electric generating units (EGUs) and large industrial boilers.

Many of the EGUs within West Virginia have committed to and have installed controls through a number of mechanisms, including the Clean Air Interstate Rule (CAIR), state programs and state and federal consent agreements. Reductions associated with many of these mechanisms were used to estimate the 2018 visibility improvements at Class I areas. However, since the development of the "Best and Final" emissions inventory for the Regional Haze SIP submittal, additional regulations and actions have been imposed on this source sector. These additional mandates will help ensure that the reasonable progress goals are attained on or before 2018. Moreover, as recently as the summer of 2012, several large EGUs have announced plans to either shutdown sources or curtail emissions by converting to natural gas, leading to even more significant reductions in SO_2 emissions. (See Tables 9, 10 and 11 for more source specific information.)

It is for these reasons, that the West Virginian Department of Environmental Protection (DEP) submits a negative declaration to EPA specifying that the West Virginia Regional Haze SIP (submitted June 18, 2008) is sufficient for meeting the requirements outlined in the RHR. Furthermore, no additional controls are necessary, based on this first West Virginia five year progress report.

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Regional Haze 5-Year Periodic Report (Covering 2008-2013) Describing Progress Towards the Reasonable Progress Goals for Visibility in Class I Federal Areas and Determination of Adequacy of Existing Implementation Plan

A. INTRODUCTION

1. REQUEST

The State of West Virginia is requesting that the United States Environmental Protection Agency (EPA) approve this submittal as meeting the requirements for a periodic report describing the progress toward meeting the reasonable progress set forth in the West Virginia Regional Haze State Implementation Plan (SIP) as required by 40 CFR 51.308(g).

Based on the evidence presented herein, the DEP is proposing a negative declaration to the EPA Administrator specifying that no additional controls are necessary during this, the first five-year progress report period.

2. BACKGROUND

Regional haze is defined as visibility impairment that is produced by a multitude of sources and activities which emit fine particles and their precursors, and which are located across a broad geographic area. These emissions are transported over large regions, including national parks, forests and wilderness areas ("Class I" federal areas). The Clean Air Act (CAA) mandates protection of visibility, especially in Class I area.

Fine particles may either be emitted directly or formed from emissions of precursors, the most important of which are sulfur dioxide (SO_2) and nitrogen oxides (NO_x). Particles affect visibility through the scattering and absorption of light, and fine particles - particles similar in size to the wavelength of light - are most efficient, per unit of mass, at reducing visibility. Therefore, reducing fine particles (particles with a diameter less than 2.5 µm), in the atmosphere is generally considered to be an effective method of reducing regional haze, and thus improving visibility. The most important sources of $PM_{2.5}$ and its precursors are coal-fired power plants, industrial boilers and other combustion sources. Other significant contributors to $PM_{2.5}$ and visibility impairment include mobile source emissions, area sources, fires, and wind blown dust.

In 1999, the U.S. Environmental Protection Agency (EPA) finalized the Regional Haze Rule (RHR) [64 FR 35714]. The rule calls for state, tribal, and federal agencies to work together to improve visibility in 156 national parks and wilderness areas. The rule addresses the combined visibility effects of various pollution sources over a wide geographic region. This wide-reaching pollution net meant that all states – even those without Class I area – would be required to participate in haze reduction efforts. EPA designated five Regional Planning Organizations (RPOs) to assist with the coordination and cooperation needed to address the visibility issue (see Figure 1). West Virginia is among those states that make up the southeastern portion of the contiguous United States and

therefore formed the RPO known as VISTAS (Visibility Improvement – State and Tribal Association of the Southeast), and includes the eastern band of Cherokee Indians, in addition to the following states: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. The Southeastern Modeling, Analysis and Planning (SEMAP) group, funded by the same ten states originally involved in VISTAS, was formed to address the next phase of ozone, fine particle and regional haze assessment obligations of the member states. The organizational change was implemented primarily as an administrative convenience.

Figure 1. Geographical Areas of Regional Planning Organizations

States are required to develop and implement air quality protection plans (State Implementation Plans – SIPs) to reduce the pollution that causes visibility impairment. These plans establish goals and emission reduction strategies based on trends from various sources, including point source emissions, area source emissions, mobile source emissions (both on-road and non-road emissions), biogenic emissions, and wildfire and agricultural emissions. Under the RHR, states are required to develop, and periodically update, SIPs to reduce visibility impairment with the express intent that by 2064, the visibility in the Class I areas will be returned to natural conditions. The rule requires States to establish reasonable progress goals (RPGs), expressed in deciviews, for visibility improvement at each Class I area covering each (approximately) 10-year period until 2064, with the first SIP, covering the first ten-year period from 2008 through 2018, which was due December 17, 2007.

States were required to establish baseline visibility conditions for 2000-2004; natural background visibility in 2064; and the rate of uniform progress between baseline and background conditions. The

first set of reasonable progress goals must be met through measures contained in the state's long-term strategy covering the first ten year period from 2008 through 2018.

The five RPOs worked together to develop the technical basis for these SIPs. The products of the regional planning organizations were used to establish monitoring strategies for evaluating visibility conditions, baselines, and trends, and to develop long-term (10-15 year) strategies for making "reasonable progress" toward eliminating all manmade visibility impairment from mandatory Class I areas. With the help of VISTAS, West Virginia developed a SIP to address visibility impairment in the State's two (2) Class I Federal Areas – the Dolly Sods Wilderness Area and the Otter Creek Wilderness Area, both located in the eastern mountains of West Virginia (see Figure 2). Although Dolly Sods and Otter Creek are separate and distinct wilderness areas, and both are mandatory Federal Class I areas, they are being treated as one area for regional haze purposes due to their close proximity to each other, and the fact that there is only one IMPROVE – Interagency Monitoring of Protected Visual Environments – monitor which is located at Dolly Sods.

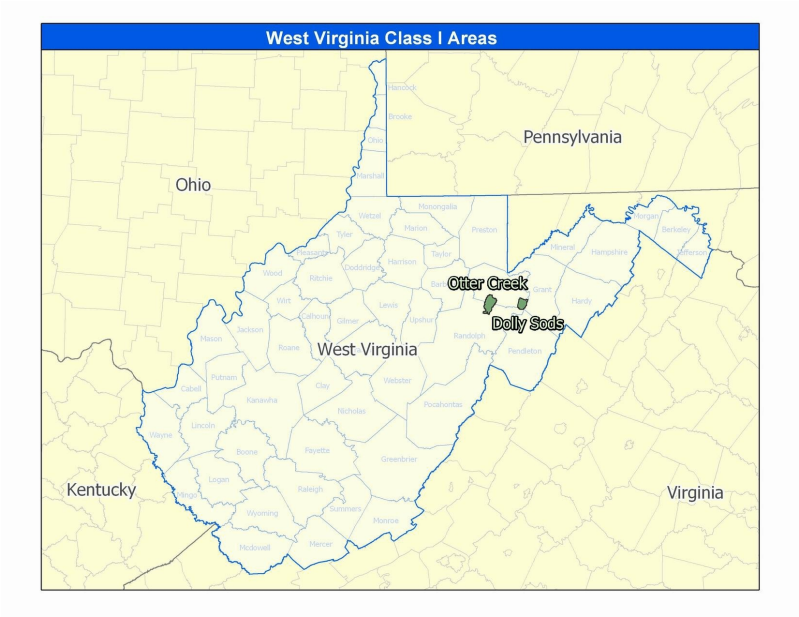


Figure 2. West Virginia Class I areas

In developing its SIP (submitted to EPA on June 18, 2008, herein referred to as the WV Regional Haze SIP), West Virginia prepared a long-term strategy and examined the possible application of Best Available Retrofit Technology (BART) in order to establish reasonable progress goals for Dolly Sods and Otter Creek. As provided in the SIP, for the 20 percent worst days, West Virginia adopted a reasonable progress goal (RPG) of a 7.3 deciview (dv) reduction in visibility impairment by 2018, which is consistent with the uniform rate of progress needed to achieve a natural background condition of 10.4 dv by 2064. Likewise, West Virginia has also adopted a reasonable progress goal for the 20 percent best days that would result in a 1.2 dv reduction in visibility impairment. The aforementioned predicted reductions in visibility impairment were expected to result from implementation of existing and planned emission controls that will be discussed in further detail.

This document is intended to address the requirements of 40 CFR 51.308(g) requiring periodic reports evaluating progress towards the RPGs established for each mandatory Class I area. To be sure, "*EPA believes that a requirement for regular SIP revisions will result in a more effective program over time and provide a focus for demonstrating ongoing progress and making mid-course corrections in emissions strategies*" [62 FR 41151]. In accordance with the requirements listed in Section 51.308(g) of the RHR, West Virginia in its original SIP committed to submitting a report on reasonable progress to EPA every five (5) years following the initial submittal of the SIP. This document fulfills this requirement and is in the form of a SIP revision. This reasonable progress report evaluates the progress made towards the RPG for Dolly Sods and Otter Creek, as well as for each mandatory Class I Federal area located outside West Virginia that may be significantly affected by emissions from West Virginia sources.

3. REQUIREMENTS FOR PERIODIC PROGRESS REPORTS

The RHR, published as final July 1, 1999 [64 FR 35714], established the following requirements for periodic reports describing the progress toward meeting the reasonable progress goals set forth in the WV Regional Haze SIP:

> 51.308(g) *Requirements for periodic reports describing progress towards the reasonable progress goals.* Each state identified in §51.300(b)(3) must submit a report to the Administrator every 5 years evaluating progress towards the reasonable progress goal for each mandatory Class I Federal area located within the State and in each mandatory Class I Federal area located outside the State which may be affected by emissions from within the State. The first progress report is due 5 years from submittal of the initial implementation plan addressing paragraphs (d) and (e) of this section. The progress reports must be in the form of implementation plan revisions that comply with the procedural requirements of §51.102 and §51.103. Periodic progress reports must contain at a minimum the following elements:
>
> (1) A description of the status of implementation of all measures included in the implementation plan for achieving reasonable progress goals for mandatory Class I Federal areas both within and outside the state.
>
> (2) A summary of the emission reductions achieved throughout the State through implementation of the measures described in paragraph (g)(1) of this section.
>
> (3) For each mandatory Class I Federal area within the State, the State must assess the following visibility conditions and changes, with values for most impaired and least impaired days expressed in terms of 5-year averages of these annual values.
>
> (i) The current visibility conditions for the most and least impaired days;
> (ii) The difference between current visibility conditions for the most impaired and least impaired days and baseline visibility conditions;

(iii) The change in visibility impairment for the most impaired and least impaired days over the past 5 years.

(4) An analysis tracking the changes over the past 5 years in emissions of pollutants contributing to visibility impairment from all sources and activities within the State. Emissions changes should be identified by type of source or activity. The analysis must be based on the most recent updated emissions inventory, with estimates projected forward as necessary and appropriate, to account for emissions changes during the applicable 5-year period.

(5) An assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred over the past 5 years that have limited or impeded progress in reducing pollutant emissions and improving visibility.

(6) An assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Federal Class I areas affected by emissions from the State, to meet all established reasonable progress goals.

(7) A review of the State's visibility monitoring strategy and any modifications to the strategy as necessary.

4. ADEQUACY OF EXISTING SIP

The RHR also establishes the following requirements for determining the adequacy of the current WV Regional Haze SIP, as submitted to EPA on June 18, 2008.

51.308(h) *Determination of the adequacy of existing implementation plan.* At the same time the State is required to submit any 5-year progress report to EPA in accordance with paragraph (g) of this section, the State must also take one of the following actions based upon the information presented in the progress report:

(1) If the State determines that the existing implementation plan requires no further substantive revision at this time in order to achieve established goals for visibility improvement and emissions reductions, the State must provide to the Administrator a negative declaration that further revision of the existing implementation plan is not needed at this time.

(2) If the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another State(s) which participated in a regional planning process, the State must provide notification to the Administrator and to the other State(s) which participated in the regional planning process with the States. The State must also collaborate with the other State(s) through the regional planning process for the purpose of developing additional strategies to address the plan's deficiencies.

(3) Where the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another country, the State shall provide notification, along with available information, to the Administrator.

(4) Where the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources within the State, the State shall revise its implementation plan to address the plan's deficiencies within one year.

B. SUMMARY OF THE EXISTING WV REGIONAL HAZE SIP

The regional haze rule required States to establish reasonable progress goals, expressed in deciviews, for visibility improvement at each affected Class I area, covering each (approximately) ten-year period until 2064. The first set of reasonable progress goals was required to be met through measures contained in the state's long-term strategy covering the period from the baseline until 2018. This section discusses development of West Virginia's long-term strategy, which was laid out in the Regional Haze SIP submitted to EPA on June 18, 2008.

1. RELATIVE CONTRIBUTIONS TO VISIBILITY IMPAIRMENT: POLLUTANTS, SOURCE CATEGORIES AND GEOGRAPHIC AREAS

An important step toward identifying future reasonable progress measures for inclusion in the Regional Haze SIP was to identify the key pollutants contributing to visibility impairment at each Class I area. To understand the relative benefit of further reducing emissions from different pollutants, source sectors and geographic areas, VISTAS engaged the Georgia Institute of Technology to perform emission sensitivity model runs using CMAQ. Emissions sensitivities were initially performed for three episodes representing winter and summer conditions: Jan 2002, July 2001 and July 2002. These runs used the initial 2018 projection inventory and considered 30% reductions from specific pollutants, source categories and geographic areas. Emissions sensitivities were repeated using the 2009 Base D projection inventory and two month-long episodes from 2002; Jun 1 - Jul 10 and Nov 19 - Dec 19. Emissions in 2009 were reduced by 30% for each pollutant sensitivity run. The pollutant contributions that were evaluated were:

- SO_2 from EGU sources in each VISTAS state, other RPOs in the VISTAS 12-km grid, and Boundary Conditions from outside the 12-km domain
- SO_2 from non-EGU point sources in each VISTAS state, other RPOs and Boundary Conditions
- NO_x from ground level (on-road plus non-road area) sources in each VISTAS state and other RPOs
- NO_x from point (EGU plus non-EGU) sources in each VISTAS state and other RPOs
- NH_3 from all sources in VISTAS and other RPOs
- Volatile Organic Compounds from anthropogenic sources in the 12-km modeling domain
- Primary Carbon from all ground level sources in each VISTAS state and other RPOs
- Primary Carbon from all point source sin each VISTAS State and other RPOs
- Primary Carbon from all fires in each VISTAS state and other RPOs

Results are shown in Figure 3 below for the average of the 20 percent worst visibility days for Dolly Sods. Responses for the 20 percent worst days were calculated by averaging the responses for the 20 percent worst days that were modeled in the two episodes. For Dolly Sods, responses on 9 of the 20 percent worst visibility days were included in the graphic.

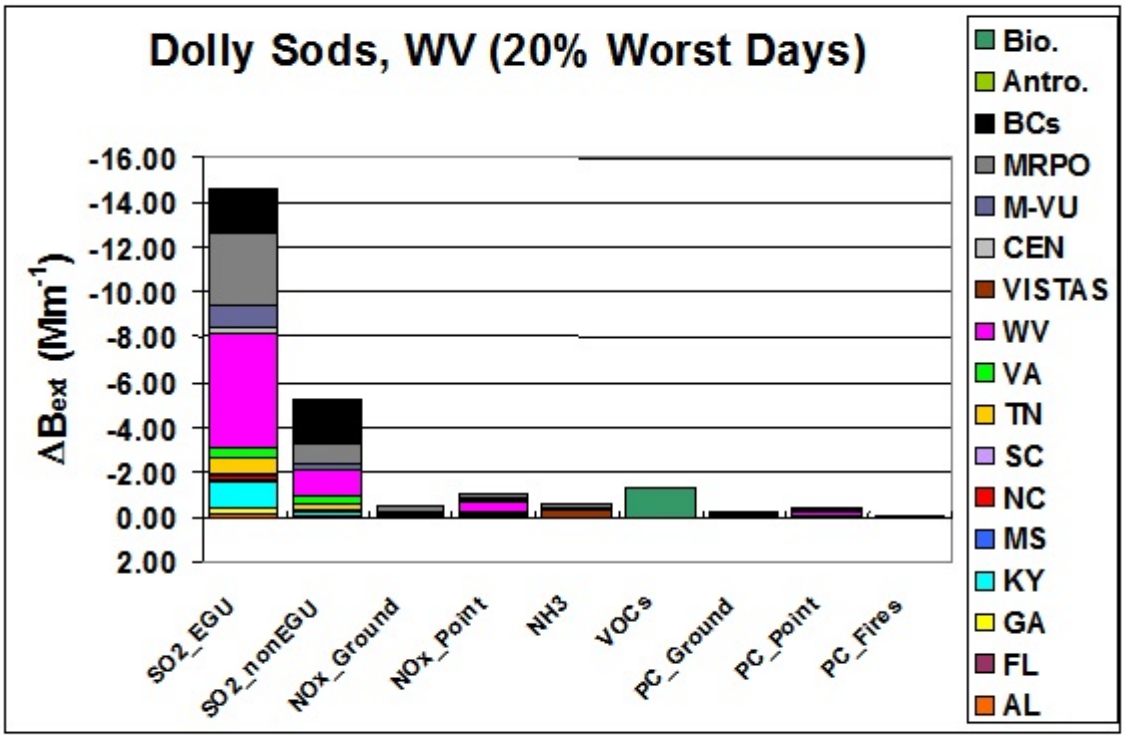


Figure 3. CMAQ projections of visibility responses on 20% worst days at Dolly Sods, WV to 30% reductions from 2009 Base D inventory for visibility-reducing pollutants in different source categories and geographic areas.

As Figure 3 illustrates, the greatest visibility benefits on the 20 percent worst days for Dolly Sods are projected to result from further reducing SO_2 emissions from EGUs. At Dolly Sods, benefits are projected from SO_2 reductions from EGUs in several VISTAS states, including Florida, Georgia, Kentucky, North Carolina, Tennessee, Virginia and West Virginia. Contributions from other RPOs and SO_2 coming from outside the boundary are also significant. The greatest benefit would likely be from further EGU reductions in West Virginia, the MRPO, and from outside the boundary. Additional, smaller benefits would come from additional SO_2 emission reductions from non-utility, industrial point sources. Within the VISTAS states, the relative importance of SO_2 reductions from non-EGUs is similar to that for EGUs.

Ammonium nitrate is a small contributor to $PM_{2.5}$ mass and visibility impairment on the 20 percent worst days at Dolly Sods. Therefore the benefits of reducing NO_x and NH_3 are small.

Volatile Organic Compounds (VOC) in West Virginia originate primarily from biogenic sources, as vegetative emissions, and also contribute to visibility impairment. Controlling anthropogenic sources of VOC has little, if any, visibility benefit at Dolly Sods. Reducing primary carbon from

point sources, ground level sources or fires is projected to have minimal visibility benefit. This is consistent with the monitoring data which shows that most measured organic carbon is secondary in origin and primary carbon is only a small fraction of the total measured carbon (Appendix B). Reducing carbon from fires was not found to be effective because there was little fire activity at these sites on the days modeled in the sensitivity analyses.

The results indicate that sulfate is the dominate contributor to visibility impairment on the 20 percent worst days at all VISTAS sites and that ammonium nitrate can be important for sites where 20 percent worst days occur in the winter. We concluded that reducing SO_2 emissions from EGU and non-EGU point sources in West Virginia and the Midwest RPO would have the greatest visibility benefit for Dolly Sods. Contributions from other VISTAS states and MANE-VU were also significant for this area.

2. RELATIVE CONTRIBUTIONS TO VISIBILITY IMPAIRMENT: GEOGRAPHIC LOCATIONS OF THE LARGEST EMISSIONS SOURCES CONTRIBUTING TO VISIBILITY IMPAIRMENT AT DOLLY SODS AND OTTER CREEK WILDERNESS AREAS

Once it was determined that SO_2 emission reductions from EGU and non-EGU point sources in the VISTAS states would be the most effective sources to control to improve visibility at the Class I areas, the next step was to identify the specific geographic areas that most likely influence visibility in each Class I area, and then to identify the major SO_2 point sources located in those geographic areas. An SO_2 Area of Influence (AoI) was defined for each Class I area to represent the geographic area containing sources that would likely have the greatest impact on visibility at that Class I area. All SO_2 point sources within these Areas of Influence were identified and ranked by their 2018 Base G emissions. The following sections contain a broad overview of the steps in the Area of Influence analyses. See Appendix H of the WV Regional Haze SIP for a more detailed discussion of these analyses and plots for additional Class I areas.

The Area of Influence analysis was not a source apportionment modeling exercise, but rather a relative metric based on the magnitude of emissions from a source, its distance to the Class I area(s) of concern, and the sulfate extinction weighted residence time plots, developed using back trajectories. In other words, it is not an exact quantification of source-by-source contribution to visibility impairment on the 20% worst days at a specific Class I area, but a relative metric used to infer this information.

2.1. Back Trajectory Analyses

The first step was to generate meteorological back trajectories for IMPROVE monitoring sites in West Virginia and neighboring Class I areas for the 2000-2004 baseline period. Back trajectory analyses use interpolated, measured or modeled meteorological fields to estimate the most likely central path of air masses that arrive at a receptor at a given time. The method essentially follows a parcel of air backward in hourly steps for a specified length of time. Figure 4 is an example of a back trajectory analysis for Dolly Sods for the 20 percent worst days in 2002.

Back Trajectories for 2002 20% Worst Days
Dolly Sods Wilderness Area

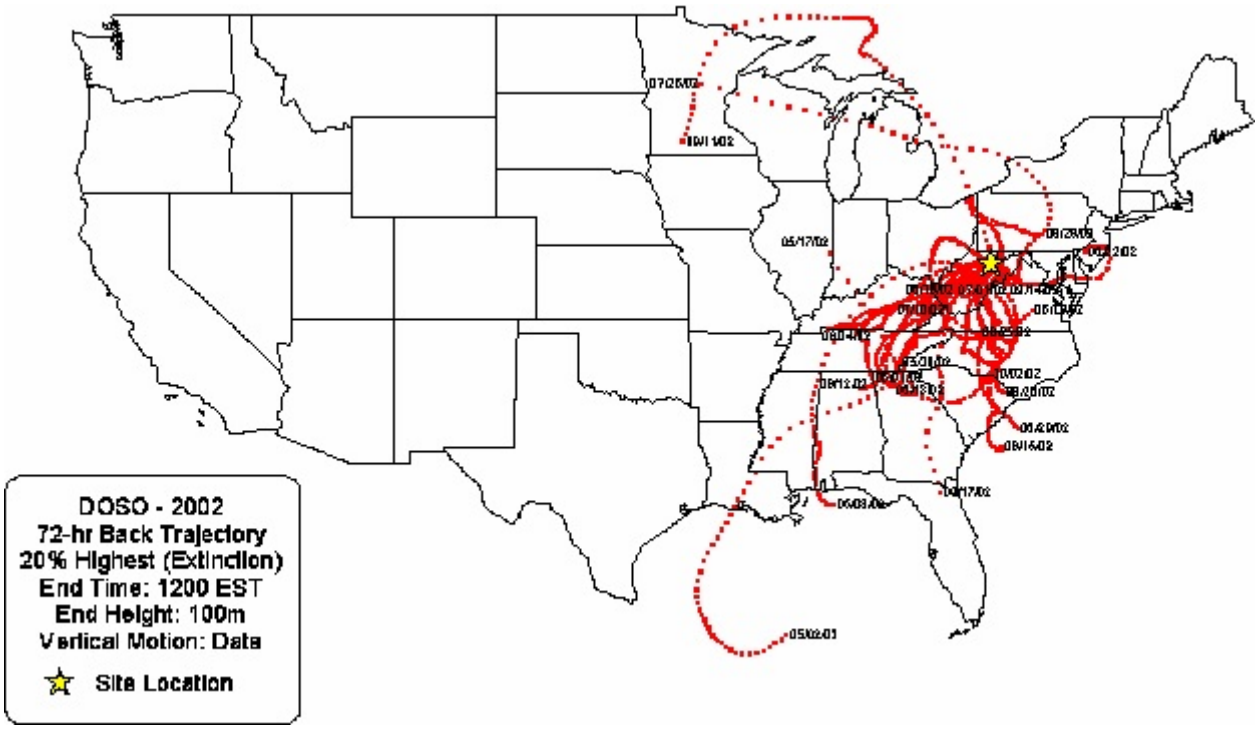


Figure 4. Example back trajectories for 20% worst visibility days in 2002 for Dolly Sods

Trajectories were started at 100 meters and 500 meters above the surface and run backward from the site for 72 hours. These individual back trajectories for the 20 percent worst days in 2002 were also useful in evaluating model performance for individual days at the Class I areas.

2.2. Residence Time Plots

The next step was to plot residence time for each Class I area using five years of back trajectories for the 20 percent worst visibility days in 2000-2004. Residence time is the frequency that winds pass over a specific geographic area on the way to a Class I area. Separate residence time plots were generated using trajectories with 100m and 500m start heights. As illustrated in Figure 5, winds influencing Dolly Sods on the 20 percent worst days come from all directions, with a significant southwest-northeast gradient influencing the 20 percent worst visibility days.

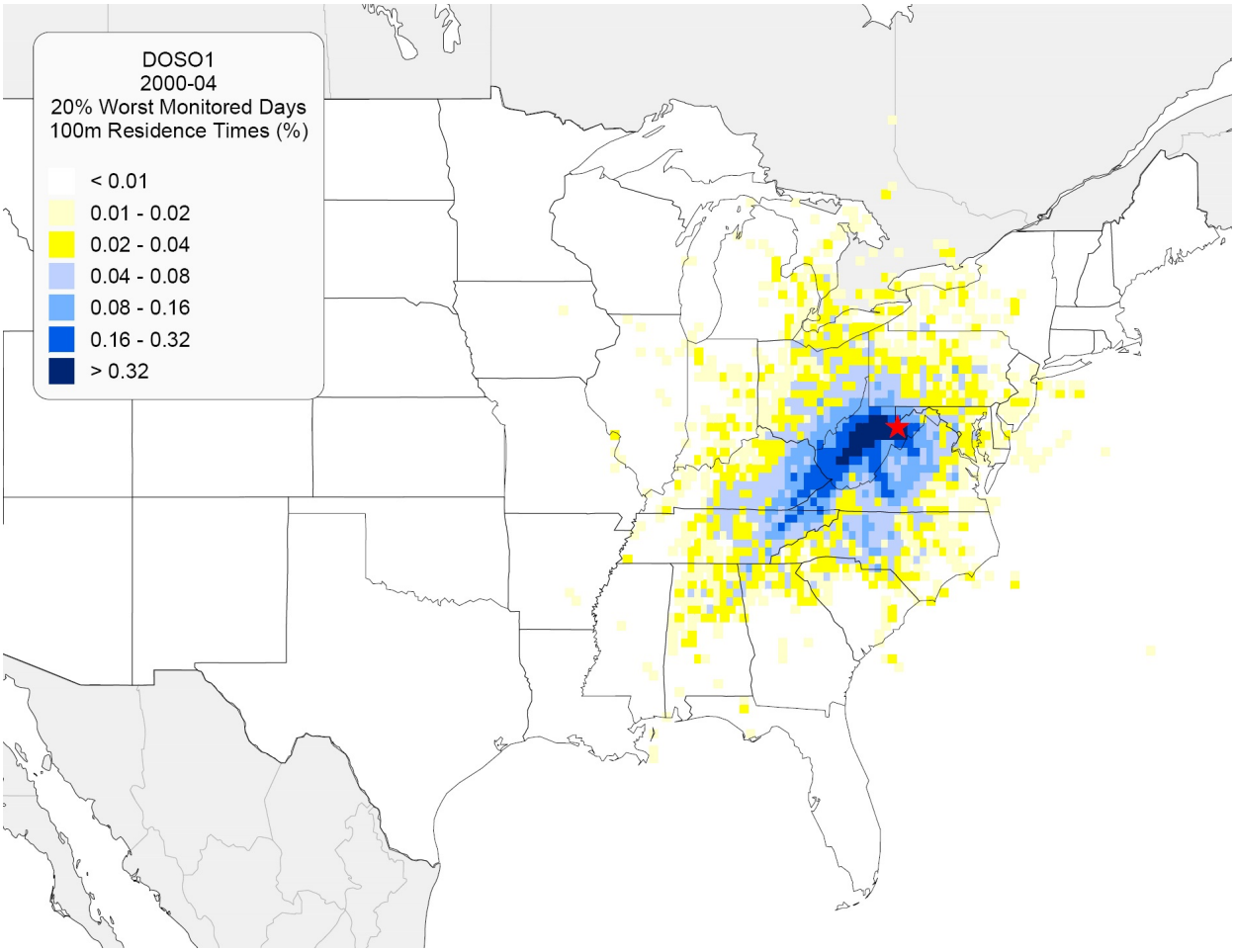


Figure 5. Residence time plot for 20% worst visibility days in 2000-2004 for Dolly Sods. Based on trajectories with 100m start height.

2.3. SO_2 Areas of Influence

The next step was to develop sulfate extinction-weighted residence time plots to define the geographic area with the highest probability of influencing the receptor on the 20 percent worst days in 2000-2004 that were dominated by sulfate. Each back trajectory was weighted by sulfate extinction for that day. This allowed us to focus on the 20 percent worst days that are influenced by sulfate and place less importance on days influenced by organic carbon from fires. Sulfate weighted back trajectories for 20 percent worst days were combined for 5 years of data. The resulting sulfate extinction-weighted residence time plots were used to define the geographic Area of Influence for sources of SO_2 emissions. In Figure 6 the area representing 10 percent or greater residence time is outlined in red and the area representing 5 percent or greater residence time is outlined in gray. The VISTAS states focused their analyses on the Area of Influence defined by 5 percent or greater sulfate extinction-weighted residence time.

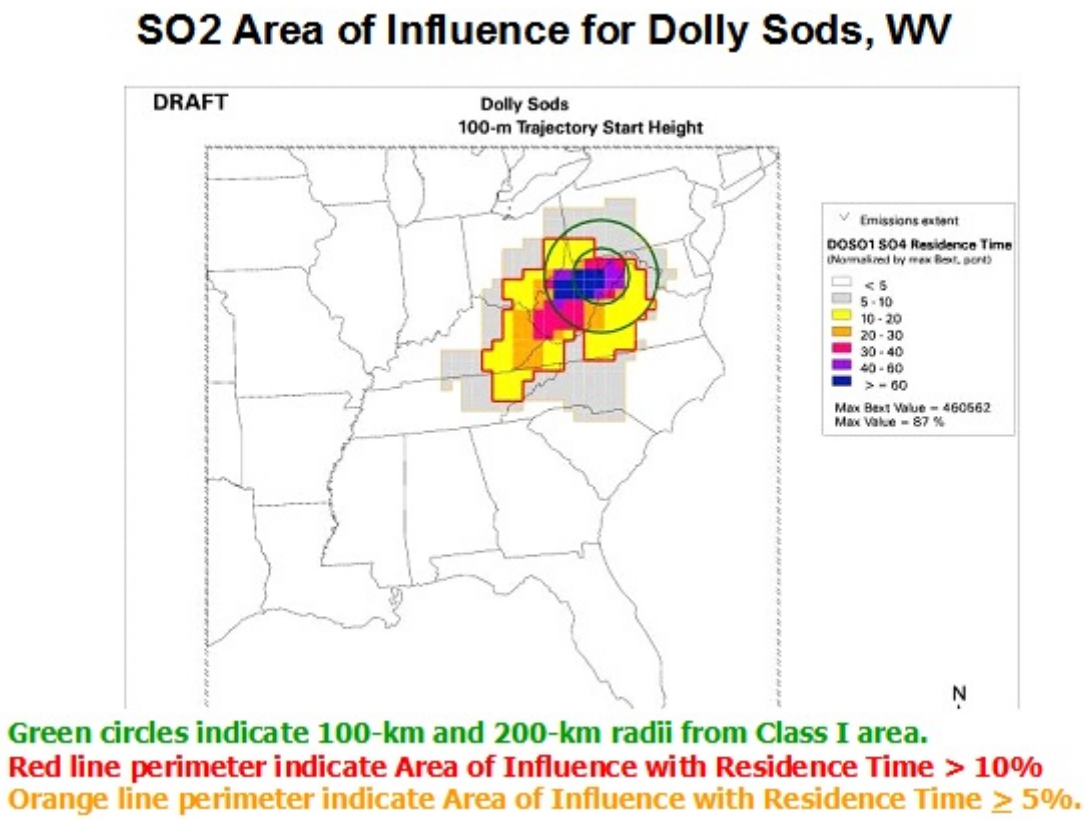


Figure 6. SO_2 Area of Influence plot for sulfate extinction weighted residence time for 20% worst visibility days in 2000-2004 for Dolly Sods. Based on trajectories with 100m start height.

2.4. Emission Sources within SO_2 Areas of Influence for Dolly Sods

Residence time plots were then combined with geographically-gridded emission data based on the 2002 baseline and 2018 Base G emissions inventories. Plots were generated for the Areas of Influence defined by trajectories with 100m and 500m start heights. As a way of incorporating the effects of transport, deposition and chemical transformation of point source emissions along the path of the trajectories, these data were weighted by 1/d, where d was calculated at the distance between grid cell centers, in kilometers. The distance-weighted point source SO_2 emissions were then combined with the gridded, extinction-weighted back-trajectory residence times at a spatial resolution of 36-km.

The final step was to combine the residence times and gridded emissions data in plots and data sets. The distance weighted (1/d), gridded point source SO_2 emissions were multiplied by the total extinction-weighted back-trajectory residence times on a grid cell by grid cell basis. These results were then normalized by the domain-wide total and displayed as a percentage. The analysis was done using both the 2002 and 2018 base year inventories.

Figure 7 illustrates 2002 and 2018 distance weighted, gridded emissions multiplied by sulfate-weighted residence time plots for Dolly Sods. These maps help visualize where emissions reductions will be occurring between 2002 and 2018. The change in SO_2 emissions between 2002 and 2018 can be seen by comparing emission source strengths in the two plots. Note the emissions from each source are normalized by the total emissions in the domain. Sources that reduce SO_2 emissions by 2018 will show a lower contribution to emissions in the domain. On the 2018 map, the grid cells with these sources will show a lighter color gradient than on the 2002 map. For example, SO_2 reductions from EGUs in western West Virginia resulting from CAIR can be seen by comparing the 2002 and 2018 maps. Because the total emissions in the domain are smaller in 2018, a source that does not change emissions between 2002 and 2018 may actually appear to increase in importance in 2018 compared to 2002.

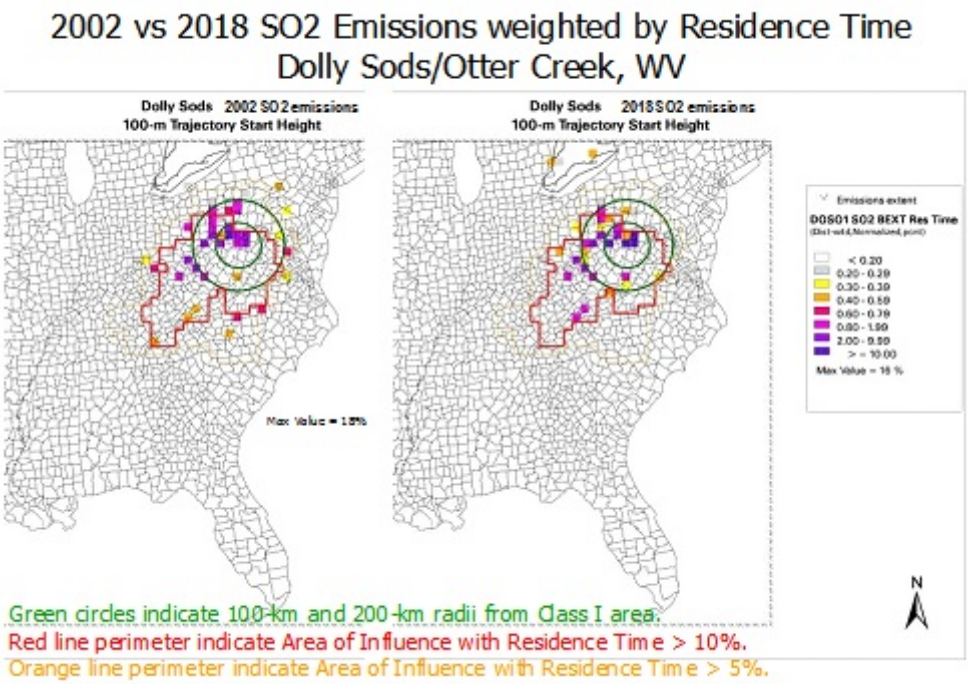


Figure 7. Dolly Sods 2002 (left) and 2018 (right) SO_2 distance weighted emissions * SO_4 extinction-weighted residence time plots.

Figure 8 illustrates the SO_2 distance weighted emissions * sulfate weighted residence time plots for 2018 emissions for Dolly Sods. This plot illustrates the relative importance of West Virginia sources compared to sources in neighboring states. Additional analyses, including 2002 and 2018 distance weighted emissions * residence time plots for Dolly Sods and the Class I areas in neighboring states were contained in Appendix H of the WV Regional Haze SIP.

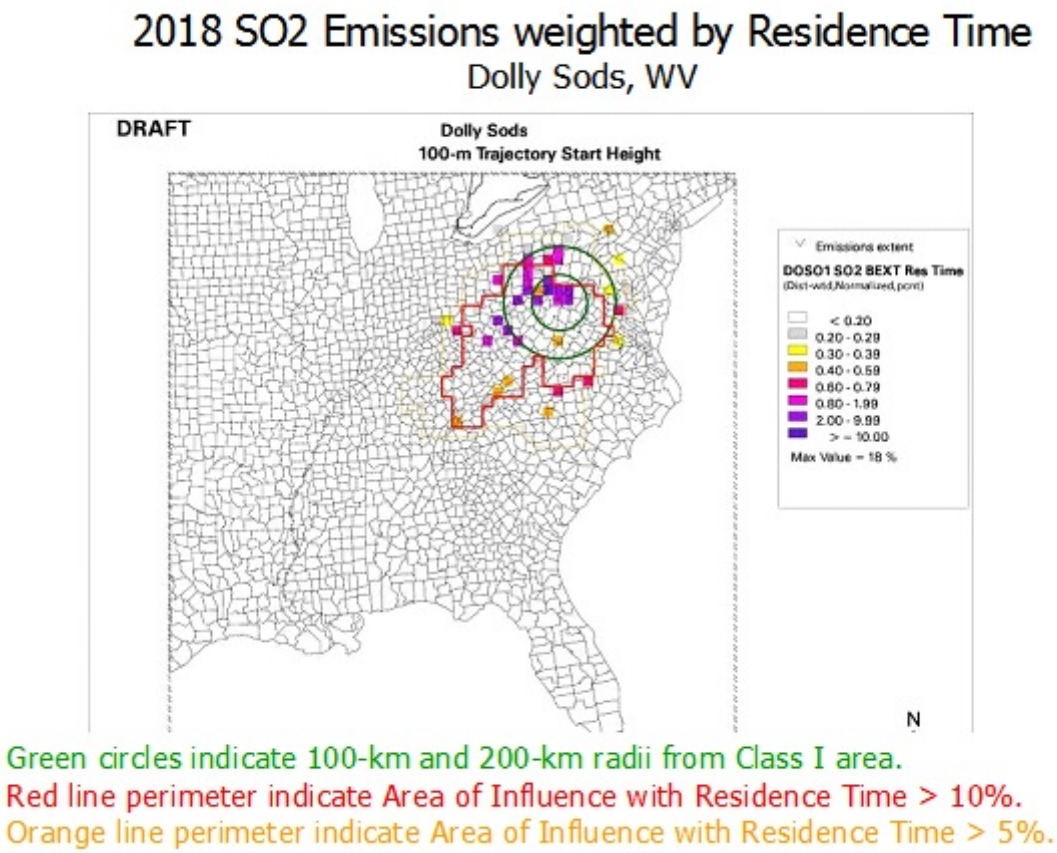


Figure 8. 2018 SO_2 distance weighted emissions * SO4 extinction weighted residence time plot for Dolly Sods, WV.

Table 1 shows, in tabular form, the relative contributions of point source SO_2 emissions from nearby states to Dolly Sods. Again it should be noted, as stated in the introduction to section B.2, that the Area of Influence analysis is not a source apportionment modeling exercise, but rather a relative metric based on the magnitude of emissions from a source, its distance to the Class I area(s) of concern, and the sulfate extinction weighted residence time plots, developed using back trajectories. In other words, it is not an exact quantification of source-by-source contribution to visibility impairment on the 20% worst days at a specific Class I area, but a relative metric used to infer this information.

Table 1. 2018 SO_2 Point Source Contribution to Dolly Sods, WV by State			
State	**Relative Contribution**	**State**	**Relative Contribution**
Kentucky	1.34%	South Carolina	0.09%
Maryland	11.81%	Tennessee	1.25%
North Carolina	0.80%	Virginia	5.73%
Ohio	7.37%	West Virginia	66.35%
Pennsylvania	5.26%		

There were 323 units identified within the Area of Influence which were projected to contribute to sulfate at Dolly Sods, including seventy-seven (77) units in West Virginia. Twenty-nine (29) units were projected to have a relative contribution greater than 0.5% and contribute 72.11% to sulfate, including seventeen (17) units in West Virginia, 15 of which are EGUs. Table 2 identifies the 29 units within the AoI for Dolly Sods that are projected to contribute at least 0.5% to the total sulfate. Seventeen (17) units have a projected relative contribution greater than 1.0% and contribute 64.28% to sulfate, including fourteen (14) units in West Virginia, all of which are EGUs.

Table 2. Point Source Units Contributing at least 0.5% to Sulfate at Dolly Sods

Source Identification						2002 Base Year	2018 Base Case		AoI and Associated Metrics			Q/d*RTMax State/Source Contribution		
State	FIPS CNTY	Plant ID	Plant Name	Point ID	SIC	SO_2 Emissions (tpy)	Q SO_2 Emissions (tpy)	CE (%)	Distance (km)	Q/d	RT Max	Q/d * RTMax	Unit % Contribution to Total Q/d* RTMax	State % Contribution to Total Q/d* RTMax
MD	**001**	**001-0011**	**New Page - Luke Mill**	**1**	**2621**	**10,160**	**9,610**	**0**	**51.59**	**186.26**	**42.35**	**7,888.1**	**5.25%**	11.81%
MD	**001**	**001-0011**	**New Page - Luke Mill**	**2**	**2621**	**8,923**	**8,441**	**0**	**51.59**	**163.60**	**42.35**	**6,928.5**	**4.61%**	11.81%
OH	167	0684000000	Muskingum River Power Plant	B006	4911	0	5,034	90	201.89	24.94	49.41	1,232.3	0.82%	7.37%
OH	053	0627010056	Gavin Power Plant	B003	4911	19,222	6,479	95	233.68	27.73	28.16	780.9	0.52%	7.37%
OH	053	0627010056	Gavin Power Plant	B004	4911	12,601	6,465	90	233.68	27.66	28.16	778.9	0.52%	7.37%
PA	059	4205900006	Allegheny Energy Supply Co/Hatfields Ferry	032	4911	53,016	2,220	90	93.77	23.68	36.51	864.6	0.58%	5.26%
PA	059	4205900006	Allegheny Energy Supply Co/Hatfields Ferry	031	4911	55,695	2,215	90	93.77	23.62	36.51	862.4	0.57%	5.26%
PA	059	4205900006	Allegheny Energy Supply Co/Hatfields Ferry	033	4911	50,001	2,213	90	93.77	23.60	36.51	861.6	0.57%	5.26%
TN	163	0003	Eastman Chemical Company	021520	2869	16,855	16,729	4	397.20	42.12	21.07	887.5	0.59%	1.25%
VA	**580**	**00003**	**MeadWestVaco Packaging Resource Group**	**25**	**2611**	**8,552**	**9,997**	**0**	**153.90**	**64.96**	**24.77**	**1,609.1**	**1.07%**	5.73%
WV	**023**	**0003**	**Mount Storm Power Plant**	**001**	**4911**	**8,817**	**3,191**	**95**	**17.36**	**183.81**	**74.90**	**13,767.4**	**9.16%**	66.35%
WV	**023**	**0003**	**Mount Storm Power Plant**	**002**	**4911**	**9,572**	**3,191**	**95**	**17.36**	**183.81**	**74.90**	**13,767.4**	**9.16%**	66.35%
WV	**023**	**0003**	**Mount Storm Power Plant**	**003**	**4911**	**2,779**	**2,923**	**94.98**	**17.36**	**168.39**	**74.90**	**12,612.4**	**8.39%**	66.35%
WV	**033**	**0015**	**Monongahela Power Co - Harrison**	**003**	**4911**	**2,582**	**5,998**	**97.98**	**82.67**	**72.56**	**86.63**	**6,285.9**	**4.18%**	66.35%
WV	**033**	**0015**	**Monongahela Power Co - Harrison**	**002**	**4911**	**2,731**	**5,954**	**97.98**	**82.67**	**72.02**	**86.63**	**6,239.1**	**4.15%**	66.35%
WV	**033**	**0015**	**Monongahela Power Co - Harrison**	**001**	**4911**	**3,355**	**5,908**	**97.98**	**82.67**	**71.47**	**86.63**	**6,191.4**	**4.12%**	66.35%
WV	**023**	**0014**	**North Branch Power Station**	**002**	**4911**	**323**	**1,018**	**94.98**	**18.73**	**54.33**	**74.90**	**4,069.3**	**2.71%**	66.35%
WV	**023**	**0014**	**North Branch Power Station**	**001**	**4911**	**324**	**1,004**	**95**	**18.73**	**53.63**	**74.90**	**4,016.9**	**2.67%**	66.35%

Table 2. Point Source Units Contributing at least 0.5% to Sulfate at Dolly Sods

Source Identification						2002 Base Year	2018 Base Case		AoI and Associated Metrics			Q/d*RTMax State/Source Contribution		
State	FIPS CNTY	Plant ID	Plant Name	Point ID	SIC	SO_2 Emissions (tpy)	Q SO_2 Emissions (tpy)	CE (%)	Distance (km)	Q/d	RT Max	Q/d * RTMax	Unit % Contribution to Total Q/d* RTMax	State % Contribution to Total Q/d* RTMax
WV	**073**	**0005**	**Monongahela Power Co - Pleasants Power**	**001**	**4911**	**21,507**	**6,334**	**90**	**149.65**	**42.33**	**61.20**	**2,590.6**	**1.72%**	66.35%
WV	**073**	**0005**	**Monongahela Power Co - Pleasants Power**	**002**	**4911**	**20,090**	**6,165**	**90**	**149.65**	**41.20**	**61.20**	**2,521.4**	**1.68%**	66.35%
WV	**061**	**0001**	**Monongahela Power Co - Fort Martin Power**	**001**	**4911**	**46,852**	**4,922**	**90**	**78.30**	**62.86**	**36.51**	**2,295.0**	**1.53%**	66.35%
WV	**061**	**0001**	**Monongahela Power Co - Fort Martin Power**	**002**	**4911**	**42,467**	**4,890**	**90**	**78.30**	**62.45**	**36.51**	**2,280.0**	**1.52%**	66.35%
WV	**079**	**0006**	**Appalachian Power - John E. Amos**	**003**	**4911**	**39,570**	**10,821**	**90**	**219.63**	**49.27**	**39.08**	**1,925.5**	**1.28%**	66.35%
WV	**053**	**0009**	**Appalachian Power - Mountatineer**	**001**	**4911**	**39,064**	**11,433**	**90**	**217.38**	**52.60**	**30.89**	**1,624.8**	**1.08%**	66.35%
WV	077	0001	Monongahela Power Co - Albright	003	4911	11,273	660	90	46.21	14.29	87.09	1,244.5	0.83%	66.35%
WV	079	0006	Appalachian Power - John E. Amos	002	4911	27,651	6,694	90	219.63	30.48	39.08	1,191.2	0.79%	66.35%
WV	079	0006	Appalachian Power - John E. Amos	001	4911	30,015	6,613	90	219.63	30.11	39.08	1,176.7	0.78%	66.35%
WV	073	0006	Cabot Corporation - Ohio River Plant	002	2895	2,025	2,803	0	168.40	16.64	61.20	1,018.4	0.68%	66.35%
WV	073	0006	Cabot Corporation - Ohio River Plant	003	2895	1,734	2,400	0	168.40	14.25	61.20	872.1	0.58%	66.35%
									TOTAL All Sources			150297.6	100.00%	323 units
									Contribution from 0.5% sources			108,383.7	72.11%	29 units
									Contribution from 1.0% Sources			**96,612.8**	**64.28%**	**17 units**

Note: Units identified in black text are EGUs, units identified in blue text are non-EGUs.
Units identified with bold text have greater than 1.0% contribution to sulfate.

2.5. Specific Source Types in the Area of Influence for Dolly Sods and Otter Creek Wilderness Areas

The next step in the analysis was to review the emissions inventories to determine the source categories, as well as specific sources, found to have the greatest impact on visibility at Dolly Sods and Otter Creek Wilderness Areas. Lists of SO_2 point sources found within the Area of Influence for each Class I area were developed using the most current (Base G) VISTAS 2002 base year and 2018 future year emissions. For this purpose the Area of Influence was defined as the counties with maximum sulfate extinction weighted residence time greater than five (5). For SO_2 sources within each Area of Influence, the following attributes were defined for each individual unit:

- State, county, source (plant) and industry identification codes
- SO_2 emissions for 2002 and 2018
- 2018 control efficiency
- Distance to Class I areas (defined by centroid of the Class I area)
- Emissions divided by distance (Q/d), a metric that accounts for dispersion of emissions over distance
- Maximum sulfate extinction weighted residence time (Rtmax)

The review was conducted in a top down fashion starting with an analysis of the major source categories in each SO_2 Area of Influence to determine which major categories had the highest residual contribution to the area in 2018. It was also important to identify reductions that are projected to occur between 2002 and 2018 within each category or at specific units. This allowed VISTAS states to determine if certain source categories or units that had yet to be controlled under the future year base case had the potential for reduction. Once the highest source types were identified, subcategories within those sources types were reviewed. The contributions from major source categories to the 2018 Base G2 inventory for the SO_2 Area of Influence for Dolly Sods are listed in Table 3.

Annual 2018 BaseG2 Emissions (%) Within Area of Influence
Dolly Sods, WV

Tier	VOC	NOX	CO	SO2	PM-10	PM-2.5	NH3
Fuel Comb. Elec. Util.	1%	25%	1%	53%	15%	26%	1%
Fuel Comb. Industrial	1%	17%	1%	27%	4%	5%	0%
Fuel Comb. Other	6%	8%	4%	6%	7%	14%	1%
Chemical & Allied Product Mfg	2%	0%	1%	2%	1%	1%	1%
Metals Processing	1%	2%	5%	4%	3%	6%	0%
Petroleum & Related Industries	0%	0%	0%	2%	0%	0%	0%
Other Industrial Processes	4%	6%	0%	5%	9%	11%	1%
Solvent Utilization	41%	1%	0%	0%	0%	1%	0%
Storage & Transport	6%	0%	1%	0%	1%	1%	0%
Waste Disposal & Recycling	4%	2%	3%	0%	4%	9%	0%
Highway Vehicles	19%	21%	47%	0%	2%	2%	13%
Off-highway	14%	17%	36%	0%	2%	5%	0%
Miscellaneous	1%	0%	2%	0%	52%	20%	81%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 3. 2018 Emissions Contributions from Major Source Categories in the Area of Influence for Dolly Sods, WV

This table indicates that for Dolly Sods, Electric Utilities and Industrial Boilers are the two major source categories contributing to 2018 SO_2 emissions in the Area of Influence, even after implementation of CAIR. Together these two source categories contribute 80 percent of the 2018 SO_2 emissions to the Area of Influence for Dolly Sods. Other Fuel Combustion and Other Industrial Processes comprise another 11% of the 2018 SO_2 emissions.

This table can also be used to evaluate the major source categories contributing to emissions of NO_x, NH_3 and PM emissions in 2018. For instance, highway vehicles and off-road vehicles are major sources of NO_x emissions, in addition to electric utilities and industrial boilers. The source category "miscellaneous" (which includes agricultural sources and fires) is the major contributor to NH_3 and primary PM.

The contributions to SO_2 emissions in 2018 from the three highest source categories, Electric Utilities, Industrial Boilers and Other Fuel Combustion have been further broken out into subcategories. Table 4 indicates subcategories for the Area of Influence for Dolly Sods. Within Electric Utilities, all the SO_2 emissions are attributable to coal-fired power plants. Within Industrial Boilers, most emissions are attributable to coal-fired boilers with lesser contributions from oil and gas boilers. Commercial and institutional coal- and oil-fired boilers have smaller contributions.

Annual 2018 BaseG2 Emissions (%) Within Area of Influence
Dolly Sods, WV

Tier	SO2
Fuel Comb. Elec. Util.-Coal	**52%**
Fuel Comb. Elec. Util.-Oil	**1%**
Fuel Comb. Elec. Util.-Gas	0%
Fuel Comb. Elec. Util.-Other	0%
Fuel Comb. Elec. Util.-Internal Combustion	0%
Fuel Comb. Industrial-Coal	**23%**
Fuel Comb. Industrial-Oil	**3%**
Fuel Comb. Industrial-Gas	**1%**
Fuel Comb. Industrial-Other	0%
Fuel Comb. Industrial-Internal Combustion	0%
Fuel Comb. Other-Commercial/Institutional Coal	**3%**
Fuel Comb. Other-Commercial/Institutional Oil	**1%**
Fuel Comb. Other-Commercial/Institutional Gas	0%
Fuel Comb. Other-Misc. Fuel Comb. (Except Residential)	0%
Fuel Comb. Other-Residential Wood	0%
Fuel Comb. Other-Residential Other	**2%**

Table 4. 2018 SO_2 Emissions contributions from Major Source Categories in the Area of Influence for Dolly Sods

These analyses indicated West Virginia should consider what additional control measures for electric utilities and industrial boilers were reasonable. The lists of individual sources was also used to determine if individual sources in other sources categories were major contributors to SO_2 emissions in the Area of Influence.

The WVDAQ elected to focus on those units that contributed at least one percent to sulfate visibility impairment at a given Class I area. First, the units with the larger contribution toward visibility impairment would likely show an environmental benefit under a control evaluation, and WVDAQ would be able to use that environmental benefit to require controls on a given unit. Second, there are several regulatory programs that use a higher threshold than one percent for evaluation thresholds.

1. The BART rule specifies that a maximum impact of 0.5 dv is an acceptable threshold for establishing significance. This threshold equates to roughly a 5 percent change in visible perception. This same significance level is used in the Prevention of Significant Deterioration/ New Source Review program for the visibility air quality related value.

2. The NOx SIP Call laid out a significance level for Section 126 petitions of 4 parts per million (ppm), that being the level to which a State's contribution to another state's ozone problem was considered significant. Four ppm represents approximately 3.75 percent of the 1-hour ozone standard, which was in place at the time EPA promulgated the NOx SIP Call.

3. For the CAIR rule, a PM contribution of 0.2 ug/m3 was used to demonstrate a significant impact, which is 1.3% of the annual PM2.5 standard of 15 ug/m3.

4. Lastly, when human health standards are proposed (NAAQS) significant impact levels (SILS) are assigned which allow sources to determine their significance on air quality in the area around their facilities. Sources that demonstrate that their "contribution" from the new or modified sources is less than these significance levels do not have to complete any further modeling. The SILS represent a percentage of the NAAQS.

After reviewing all averaging periods for the criteria pollutants, WVDAQ determined that the one percent threshold we were proposing for reasonable further progress was as protective or more protective than the significant impact levels. The most restrictive threshold identified was for NOx, which has a NAAQS of 100 ug/m3 and a significance level of 1 ug/m3, which represents one percent of the total.

Finally, WVDAQ considered available resources to evaluate the sources in each Class I area's sulfate AoI. WVDAQ recognized that there was neither sufficient time or resources available to evaluate all units within a given AoI. Therefore, a threshold was needed to determine which units would be evaluated. Table 5 shows that a one percent contribution threshold captures greater than 64% of the total point source SO_2 contribution to Dolly Sods, while requiring an evaluation of only 17 units. The next 27% of cumulative contribution may be attributed to units with individual contribution between 0.1% - 1% and would require analysis of 97 additional units. The WVDAQ believes that the one percent threshold was appropriate, given the contribution to the total visibility impairment at each Class I area, and the limited resources available to conduct the unit-by-unit evaluation for reasonable progress.

Table 5. Numbers and Percentages of 2018 SO_2 Emission Units that Contribute to Sulfate Visibility Impairment at Dolly Sods

	Dolly Sods
# Units Contributing > 1%	17
Percentage of total Contribution	64.28%
# Units Contributing > 0.1%, but < 1%	97
Percentage of total Contribution	27.33%
# Units Contributing < 0.1%	209
Percentage of total Contribution	8.38%

3. CURRENT REASONABLE PROGRESS GOALS

The regional haze rule at 40 CFR 51.308(d)(1) required States to establish reasonable progress goals (RPG) for each Class I area within the state (expressed in deciviews) that provide for reasonable progress towards achieving natural visibility. In addition, EPA released guidance on June 7, 2007 to use in setting reasonable progress goals. The goals were required to provide for improvement in visibility for the most impaired days, and ensure no degradation in visibility for the least impaired days over the State Implementation Plan (SIP) period.

In accordance with the requirements of 40 CFR §51.308(d)(1), the Regional Haze Implementation Plan established reasonable progress goals for Dolly Sods and Otter Creek Wilderness areas. To calculate the rate of progress represented by each reasonable progress goal, WVDAQ compared baseline visibility conditions to natural visibility conditions in each class I area and determined the uniform rate of visibility improvement (in deciviews) that would need to be maintained during each implementation period in order to attain natural visibility conditions by 2064. The Reasonable Progress Goals were based on the available Base G2 modeling results, and represented the best data available at the time of submittal, June 18, 2008.

Table 6. West Virginia Reasonable Progress Goals

Class I Area	Baseline Visibility (Deciviews)	Reasonable Progress Goal (Deciview Improvement Expected by 2018, 20% Worst Days)	Reasonable Progress Goal (Deciview Improvement Expected by 2018, 20% Best Days)	Deciview Improvement Needed 2018 - 2064 (20% Worst Days)
Dolly Sods Wilderness Area	29.0	7.3	1.2	11.3
Otter Creek Wilderness Area	29.0	7.3	1.2	11.3

C. PERIODIC PROGRESS REPORT
[40 CFR 51.308(g)]

40 CFR 51.308(g) of the RHR requires the state to submit:

> [A] report to the Administrator every 5 years evaluating progress towards the reasonable progress goals for each mandatory Class I Federal area located within the State and in each mandatory Class I Federal area located outside the State which may be affected by emissions from within the state.

Figure 9 illustrates the Class I Federal areas located within VISTAS/SEMAP, as well as the neighboring Class I Federal areas which may be affected by emissions from within West Virginia.

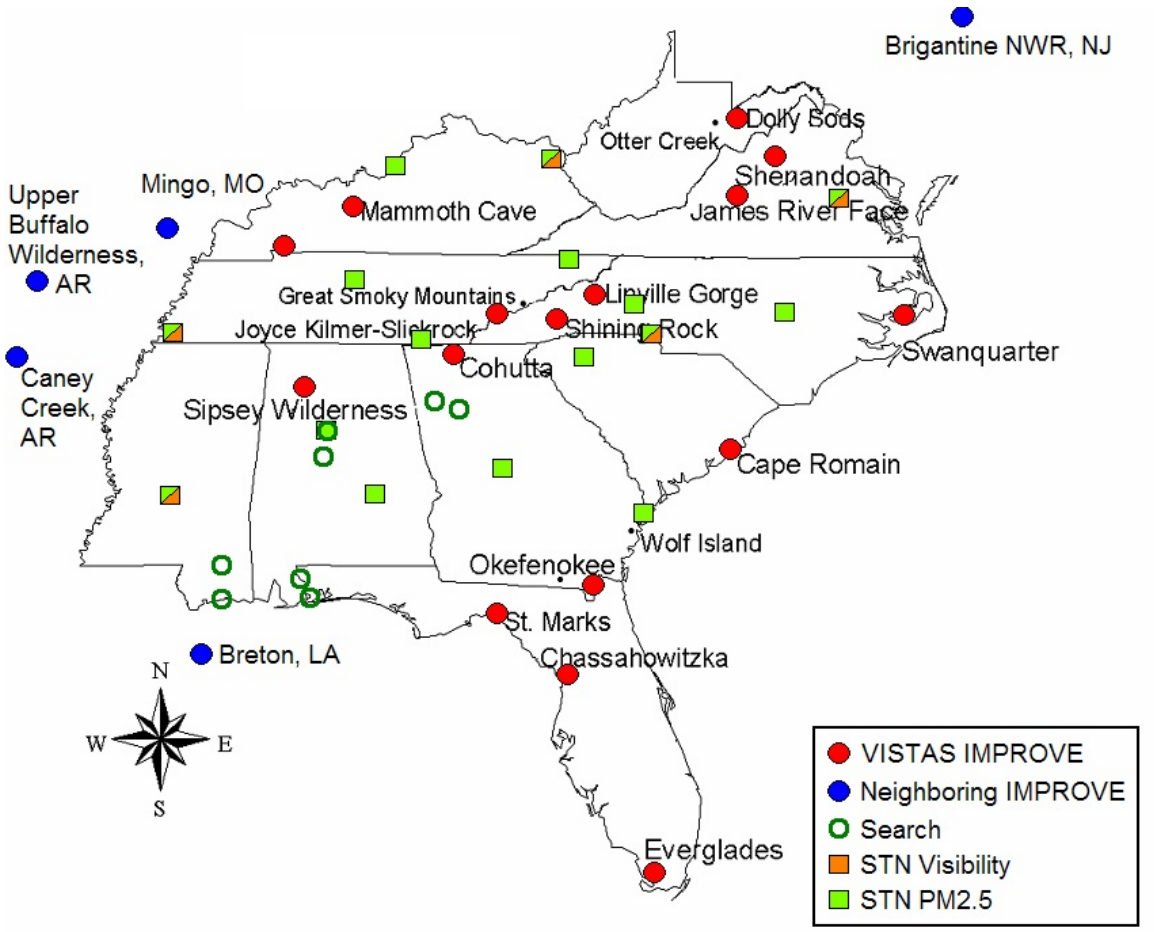


Figure 9. VISTAS and neighboring Class I areas, and monitoring locations

1. STATUS OF IMPLEMENTATION MEASURES IN SIP
[40 CFR 51.308(g)(1)]

40 CFR 51.308(g)(1) requires "A description of the status of implementation of all measures included in the implementation plan for achieving reasonable progress goals for Class I areas both within and outside the state."

This summary provides a status of the emission reduction measures that were included in the VISTAS Regional Haze "Best and Final" Emissions Inventory and reasonable progress goal modeling effort. This report covers the time period from 2008 through 2013. This summary includes discussions of benefits associated with each measure. Such benefits are quantified wherever possible. In instances where implementation of a measure did not occur in a timely manner, information is provided on the source category and its relative impact on the overall future year emissions inventories.

The paragraphs below also contain information on emissions strategies that were not included in the "Best and Final" emissions inventory and modeling effort. At the time of the "Best and Final" emissions inventory development process, these measures were not fully documented or had not yet been published in final form, and therefore the benefits of these measures were not included in future year inventories. Emissions reductions from these measures will further help ensure that each Class I area meets or exceeds the visibility progress goals set in the WV Regional Haze SIP.

1.1. Federal Programs

The emission reductions associated with the federal programs described below were included in the VISTAS future year emissions estimates. Descriptions contain qualitative assessments of emissions reductions associated with each program, and where possible, quantitative assessments. In cases where delays or modifications altered emissions reduction estimates such that the original estimates are no longer accurate, information is also provided in the effects of these alterations.

1.1.a. Clean Air Interstate Rule (CAIR) and the Cross State Air Pollution Rule (CSAPR)

On May 12, 2005, EPA promulgated CAIR, which required reductions in emissions of NO_x and SO_2 from large fossil fuel-fired EGUs. The U.S. Court of Appeals for the D.C. Circuit ruled on petitions for review of CAIR and CAIR Federal Implementation Plans, including their provisions establishing the CAIR NO_x annual and ozone season and SO_2 trading programs. On July 11, 2008, the Court issued an opinion vacating and remanding these rules. However, parties to the litigation requested rehearing of aspects of the Court's decision, including the vacatur of the rules. On December 23, 2008, the Court remanded the rules to EPA without vacating them. The December 23, 2008 ruling leaves CAIR in place until EPA issues a new rule to replace CAIR in accordance with the July 11, 2008 decision.

On July 6, 2011, EPA finalized the Transport Rule, commonly referred to as the Cross-State Air Pollution Rule or CSAPR. EPA intended for this rule to replace CAIR beginning in 2012, requiring

27 states in the eastern half of the United States to reduce power plant emissions. EPA also issued a supplemental proposal for six (6) states to make ozone season (summer time) NO_x reductions. This proposal, when finalized, would bring the total number of states participating in the program to 28. CSAPR was estimated to reduce 2005 emissions from EGUs by 6,500,000 tons of SO_2 annually and 1,400,000 tons of NO_x annually in the covered states. These estimates represent a 71 percent reduction in SO_2 and a 52 percent reduction in NO_x from 2005 levels.

On December 30, 2012, the U.S. Court of Appeals for the DC Circuit issued a ruling staying the CSAPR pending judicial review. Oral arguments in the case were held on April 13, 2012, and on August 21, 2012 the D.C. Circuit vacated the CSAPR, ordering EPA to "continue administering CAIR pending the promulgation of a valid replacement." *[EME Homer City Generation, L.P. v. EPA, No. 11-1302*] Therefore, CAIR remains in place and enforceable until substituted by a "valid" replacement rule. West Virginia's Regional Haze SIP identifies CAIR as a control measure that is expected to achieve significant visibility improvements by 2018. West Virginia submitted a CAIR SIP to EPA in June 2006, which was subsequently updated to incorporate additional EPA rule-makings. West Virginia's CAIR SIP was approved by EPA on August 4, 2009. To the extent that West Virginia is relying on CAIR in its Regional Haze SIP, the same logic applies as it relates to reliance on CAIR in the Huntington maintenance plan, as EPA explained in the proposed *Approval and Promulgation of Air Quality Implementation Plans; West Virginia; Redesignation of the West Virginia Portion of the Huntington-Ashland, WV-KY-OH 1997 Annual PM2.5 Nonattainment Area to Attainment and Approval of the Associated Maintnenace Plan* [77 FR 68076, 15NOV2012]:

> [T]he recent directive from the DC Circuit in *EME Homer* ensures that the reductions associated with CAIR will be permanent and enforceable for the necessary time period. EPA has been ordered by the Court to develop a new rule and the opinion makes clear that after promulgating that new rule EPA must provide states an opportunity to draft and submit SIPs to implement that rule. CAIR thus cannot be replaced until EPA has promulgated a final rule through a notice-and-comment rulemaking process, states have had an opportunity to draft and submit SIPs, EPA has reviewed the SIPs to determine if they can be approved, and EPA has taken action on the SIPs, including promulgating a FIP [federal implementation plan] if appropriate. These steps alone will take many years, even with EPA and the states acting expeditiously. The Court's clear instruction to EPA that it must continue to administer CAIR until a "valid replacement" exits provides an additional backstop; by definition, any rule that replaces CAIR and meets the Court's direction would require upwind states to eliminate significant downwind contributions.
>
> Further, in vacating the Transport Rule and requiring EPA to continue administering CAIR, the DC Circuit emphasized that the consequences of vacating CAIR "might be more severe now in light of the reliance interests accumulated over the intervening four years." *EME Homer*, slip op. at 60. The accumulated reliance interests include the interests of states who reasonably assumed they could rely on reductions associated with CAIR which brought certain areas into attainment with the NAAQS. If EPA were prevented from relying on reductions associated with CAIR in

redesignation actions, states would be forced to impose additional, redundant reductions on top of those achieved by CAIR. EPA believes this is precisely the type of irrational result the court sought to avoid by ordering EPA to continue administering CAIR . For these reasons also, EPA believes it is appropriate to allow states to rely on CAIR, and the existing emissions reductions achieved by CAIR, as sufficiently permanent and enforceable pending a valid replacement rule for purposes such as redesignation. Following promulgation of the replacement rule, EPA will review SIPs as appropriate to identify whether there are any issues that need to be addressed.

1.1.b. Maximum Achievable Control Technology (MACT) Programs (40 CFR Part 63)

VISTAS applied controls to future year emissions estimates from various MACT regulations for volatile organic compounds (VOCs), SO_2, NO_x, and PM on source categories where controls were installed on or after 2002. Control estimates are documented in the report entitled "Control Packet Development and Data Sources," Alpine Geophysics, July 14, 2004. Table 7 below describes the MACTs used as control strategies for the non-EGU point source emissions. The table notes the pollutants for which controls were applied as well as the promulgation dates and the compliance dates for existing sources.

Table 7. MACT Source Categories with Compliance Dates On or After 2002

MACT Source Category	40CFR63 Subpart	Date Promulgated	Existing Source Compliance Date	Pollutants Affected
Hazardous Waste Combustion (Phase I)	Parts 63 (EEE), 261 and 270	9/30/99	9/30/03	PM
Oil & Natural Gas Production	HH	6/17/99	6/17/02	VOC
Polymers and Resins III	OOO	1/20/00	1/20/03	VOC
Portland Cement Manufacturing	LLL	6/14/99	6/10/02	PM
Publicly Owned Treatment Works (POTW)	VVV	10/26/99	10/26/02	VOC
Secondary Aluminum Production	RRR	3/23/00	3/24/03	PM
Combustion Sources at Kraft, Soda, and Sulfite Pulp & Paper Mills (Pulp and Paper MACT II)	MM	1/12/01	1/12/04	VOC
Municipal Solid Waste Landfills	AAAA	1/16/03	1/16/04	VOC
Coke Ovens	L	10/27/03	Phased from 1995-2010	VOC
Coke Ovens: Pushing, Quenching, and Battery Stacks	CCCCC	4/14/03	4/14/06	VOC

Table 7. MACT Source Categories with Compliance Dates On or After 2002				
MACT Source Category	**40CFR63 Subpart**	**Date Promulgated**	**Existing Source Compliance Date**	**Pollutants Affected**
Asphalt Roofing Manufacturing and Asphalt Processing (two source categories)	LLLLL	4/29/03	5/1/06	VOC
Metal Furniture (Surface Coating)	RRRR	5/23/03	5/23/06	VOC
Printing, Coating, and Dyeing of Fabrics	OOOO	5/29/03	5/29/06	VOC
Wood Building Products (Surface Coating)	QQQQ	5/28/03	5/28/06	VOC
Lime Manufacturing	AAAAA	1/5/04	1/5/07	PM, SO_2
Site Remediation	GGGGG	10/8/03	10/8/06	VOC
Iron & Steel Foundries	EEEEE	4/22/04	04/23/07 04/22/05 work practice std.	VOC
Taconite Iron Ore Processing	RRRRR	10/30/03	10/30/06	PM, SO_2
Miscellaneous Coating Manufacturing	HHHHH	12/11/03	12/11/06	VOC
Metal Can (Surface Coating)	KKKK	11/13/03	11/13/06	VOC
Plastic Parts and Products (Surface Coating)	PPPP	4/19/04	4/19/07	VOC
Miscellaneous Metal Parts and Products (Surface Coating) (includes Asphalt/Coal Tar Application to Metal Pipes)	MMMM	1/2/04	1/2/07	VOC
Industrial Boilers, Institutional/ Commercial Boilers and Process Heaters	DDDDD	9/13/04	9/13/07	PM, SO_2
Plywood and Composite Wood Products	DDDD	7/30/04	10/1/07	VOC
Reciprocating Internal Combustion Engines	ZZZZ	6/15/04	6/15/07	NO_x, VOC
Auto and Light-Duty Truck (Surface Coating)	IIII	4/26/04	4/26/07	VOC
Wet Formed Fiberglass Mat Production	HHHH	4/11/04	4/11/05	VOC
Metal Coil (Surface Coating)	SSSS	6/10/02	6/10/05	VOC
Paper and Other Web Coating (Surface Coating)	JJJJ	12/4/02	12/4/05	VOC
Miscellaneous Organic Chemical Production (MON)	FFFF	11/10/03	5/10/08	VOC

Use of the Industrial/Commercial/Institutional (ICI) boiler MACT standard was problematic in that the U.S. Court of Appeals for the District of Columbia Circuit vacated and remanded that regulation to EPA on June 8, 2007. However, VISTAS chose to leave the emissions reductions associated with this regulation in place since the Clean Air Act required use of alternative control methodologies under Section 112(j) for uncontrolled source categories. The applied MACT control efficiencies were 4 percent for SO_2 and 40 percent for PM_{10} and $PM_{2.5}$ to account for the co-benefit from installation of acid gas scrubbers and other control equipment to reduce HAPS.

To determine how the vacatur of this regulation may have affected the VISTAS future year inventories, VISTAS created an analysis of inventory data to determine the level of SO_2, PM_{10}, and

$PM_{2.5}$ reductions associated with the vacated regulation. Table 8 compares the level of emission reductions for VISTAS in 2009 and 2018 estimated to be derived from the vacated regulation to the total non-EGU point source inventory for those years and to the total annual inventory for those years.

Table 8: ICI Boiler MACT Reductions compared to the 2009 and 2018 VISTAS Inventory

Pollutant	ICI Boiler MACT Estimated Reductions in VISTAS States[1]		Non-EGU Inventories for VISTAS States[2]		Total Inventories for VISTAS States[2]	
	2009	2018	2009	2018	2009	2018
Primary PM_{10} (tpy)	13,325	14,556	211,267	248,367	4,151,695	4,549,680
Primary $PM_{2.5}$ (tpy)	10,892	11,919	157,615	185,490	1,124,150	1,195,487
SO_2 (tpy)	7,773	8,188	548,196	575,716	3,468,899	2,169,773

[1] ICI Boiler MACT reduction estimates taken from *VISTAS Boiler_MACT_20080611.xls*
[2] Data from *Documentation of the Base G2 and Best & Final 2002 Base Year, 2009 and 2018 Emission Inventories for VISTAS - Revision 1*, April 9, 2008 Table 2.1-15, Table 2.1-19, Table 2.1-20 and Appendix A.

The emission reductions associated with the vacated ICI Boiler MACT were a very small percentage of overall non-EGU and total inventory emissions for each of the affected pollutants. Additionally, EPA finalized the revised ICI Boiler MACT on February 21, 2011. EPA estimated that implementation of the revised rulemaking would reduce emissions nationwide from major source boilers and process heaters by 47,000 tpy of PM, 440,000 tpy of SO_2 and 7,000 tpy of VOCs.

However, in March of 2011, the EPA published a notice [76 FR 15266, 21MAR2011] stating their intention to reconsider certain aspects of the national emissions standards for hazardous air pollutants (NESHAP) for new and existing sources for Major Source industrial, Commercial and Institutional Boilers and Process Heaters; the NESHAP for new and existing sources for Area Source Industrial, Commercial and Institutional Boilers; and standards of performance for new Commercial and Industrial Solid Waste Incineration Units and emission guidelines for existing Commercial and Industrial Solid Waste Incineration Units. On December 23, 2011 [76 FR 80532] EPA published the reconsideration proposal for 40 CFR 63, Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Major Sources; Industrial, Commercial and Institional Boilers and Process Heaters; and published proposed amendments to 40 CFR 63, Subpart JJJJJJ – National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial and Institutional Boilers. In the meantime, on February 7, 2012, EPA issued a "No Action Assurance Letter" stating that they would exercise enforcement discretion to not pursue enforcement action for violations of certain notification deadlines in the final Major Source Boiler Rule (40 CFR 63, subpart DDDDD); and on March 13, 2012, EPA issued a "No Action Assurance Letter" stating that they would exercise enforcement discretion to not pursue enforcement action for violations of the initial tune-up deadlines in the final Area Source Boiler Rule (40 CFR 63, Subpart JJJJJJ). West Virginia

cannot provide specific emission reduction information for sources in the State given that the reconsideration has not yet been finalized.

1.1.c. 2007 Heavy-Duty Highway Rule (40 CFR Part 86, Subpart P)

In this regulation, EPA set a particulate matter (PM) emission standard for new heavy-duty engines of 0.01 g/bhp-hr, which took effect for diesel engines in the 2007 model year. This rule also included standards for oxides of nitrogen (NO_x) and non-methane hydrocarbons (NMHC) of 0.20 g/bhp-hr and 0.14 g/bhp-hr, respectively. These diesel engine NO_x and NMHC standards were successfully phased in together between 2007 and 2010. The rule also required that sulfur in diesel fuel be reduced to facilitate the use of modern pollution control technology on these trucks and buses. The EPA required a 97 percent reduction in the sulfur content of highway diesel fuel – from levels of 500 ppm (low sulfur diesel) to 15 ppm (ultra-low sulfur diesel). These requirements were successfully implemented on the timeline in the regulation.

1.1.d. Tier 2 Vehicle and Gasoline Sulfur Program (40 CFR Part 80, Subpart H; 40 CFR Part 85, 40 CFR Part 86)

The EPA's Tier 2 fleet averaging program for on-road vehicles, modeled after the California LEV II standards became effective in the 2005 model year. The Tier 2 program allows manufacturers to produce vehicles with emissions ranging from relatively dirty to very clean, but the mix of vehicles a manufacturer sells each year must have average NO_x emissions below a specified value. Mobile emissions continue to benefit form this program as motorists replace older, more polluting vehicles with cleaner vehicles.

1.1.e. Nonroad Diesel Emissions Program (40 CFR Part 89)

The EPA adopted standards for emissions of NO_x, hydrocarbons, and carbon monoxide (CO) from several groups of nonroad engines, including industrial spark-ignition engines and recreational non-road vehicles. Industrial spark-ignition engines power commercial and industrial applications and include forklifts, electric generators, airport baggage transport vehicles, and a variety of farm and construction applications. Nonroad recreational vehicles include snowmobiles, off-highway motorcycles, and all-terrain vehicles. These rules were initially effective in 2004 and were fully phased in by 2012.

The nonroad diesel rule set standards that reduced emissions by more than 90 percent from nonroad diesel equipment and, beginning in 2007, the rule reduced fuel sulfur levels by 99 percent from previous levels. The reduction in fuel sulfur levels applied to most nonroad diesel fuel in 2010 and applied to fuel used in locomotive and marine vessels in 2012.

1.2. EGU Federal Consent Decrees

Federal consent decrees with major utilities contained remedies that imposed control requirements or other reductions in future year emissions. Many of these requirements were taken into account

in the VISTAS 2018 "Best and Final" Inventory. [Consent Decrees that have been executed since 2008, and therefore were not included in the initial RH SIP, are discussed under Reasonable Progress in Section C.2.6.]

- Santee Cooper [US District Court of South Carolina, Charleston Division]: A 2004 consent agreement calls for Santee Cooper to install and commence operation of continuous emission control equipment for $PM/SO_2/NO_x$ emissions; comply with system-wide annual $PM/SO_2/NO_x$ emissions limits; agree not to buy, sell or trade SO_2/NO_x allowances allocated to Santee Cooper System as a result of said agreement; and to comply with emission unit limits of said agreement.

- TECO [US District Court, Middle District of Florida]: Under a settlement agreement, by 2008, Tampa Electric will install permanent emissions-control equipment to meet stringent pollution limits; implement a series of interim pollution-reduction measures to reduce emissions while the permanent controls are designed and installed; and retire pollution emission allowances that Tampa Electric or others could use, or sell to others, to emit additional NO_x, SO_2 and PM.

- VEPCO [US District Court, Eastern District of Virginia]: Virginia Electric and Power Co. agreed to spend $1.2 billion between by 2013 to eliminate 237,000 tons of SO_2 and NO_x emissions each year from eight coal-fired electricity generating plants in Virginia and West Virginia.

- Gulf Power 7 [State of Florida "Agreement for the Purpose of Ensuring Compliance with the Ozone Ambient Air Quality Standards", dated August 28, 2002]: A 2002 agreement calls for Gulf Power to upgrade its operation to cut NO_x emission rates by 61 percent at its Crist 7 generating plant by 2007 with major reductions beginning in early 2005. The Crist plant is a significant source of nitrogen oxide emissions in the Pensacola area.

- EKPC [US District Court, Eastern District of Kentucky, Central Division, Lexington]: A July 2, 2007 consent agreement between the EPA and East Kentucky Power Cooperative requires the utility to reduce its emissions of SO_2 by 54,000 tons per year and its emissions of NO_x by 8,000 tons per year, by installing and operating selective catalytic reduction (SCR) technology; low-NOx burners, and PM and mercury Continuous Emissions Monitors at the utility's Spurlock, Dale and Cooper Plants. According to the EPA, total emissions from the plants will decrease between 50 and 75 percent from 2005 levels. As with all federal consent decrees, EKPC is precluded from using reductions required under other programs, such as CAIR, to meet the reduction requirements of the consent decree. EKPC is expected to spend $654 million to install pollution controls.

- Alabama Power [US District Court, Northern District of Alabama, Southern Division]: Under a 2006 Partial Consent Decree APC agreed to spend approximately $200 million by 2012 to install pollution controls on Plant Miller Units 3 and 4. Upon full implementation,

the agreement will cause APC to reduce approximately 28,000 tons per year of emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) from Plant Miller.

- AEP [US District Court for the Southern District of Ohio, Eastern Division]: American Electric Power agreed to spend $4.6 billion dollars to eliminate 72,000 tons of NO_x emissions each year by 2016 and 174,000 tons of SO_2 emissions each year by 2018 from sixteen plants located in Indiana, Kentucky, Ohio, Virginia and West Virginia.

1.3. Non-EGU Federal Consent Decrees

The VISTAS 2009 and 2018 emissions inventories took into account unit specific requirements from several federal consent orders applicable to source types other than electrical generation, as described below.

- Dupont [US District Court for the Southern District of Ohio]: A 2007 agreement calls for E. I. Dupont Nemours & Company's James River plant to install dual absorption pollution control equipment by September 1, 2009, resulting in emission reductions of approximately 1,000 tons SO_2 annually. The sulfuric acid plant emitted 1,145 tons of SO2 in 2002. In 2009, the year in which controls were applied, the plant emitted 379 tons of SO_2.

- Stone Container [US District Court, Eastern District of Virginia]: A 2004 agreement calls for the West Point Paper Mill owned by Smurfit/Stone Container and located in West Point, Virginia, to control SO_2 emissions from the #8 Power Boiler with a wet scrubber. The scrubber was installed and operational in October of 2007. Emissions of SO2 from the facility during 2002 were 4,575 tpy. Emissions of SO2 from the facility during 2009, after installation of the scrubber, were 1,009 tpy.

1.4. State EGU Control Strategies

Emissions from EGUs have been regulated through a number of mechanisms, including CAIR, CSAPR, State programs, federal consent agreements, and various source-specific permitting actions. Reductions associated with many of these mechanisms were used to estimate the 2018 visibility improvements at the VISTAS Class I areas. Since development of the "Best and Final" inventory, additional regulations and actions have been mandated to this source sector.

1.4.a. North Carolina Clean Smokestacks Act

In June of 2002, the North Carolina General Assembly enacted the Clean Smokestacks Bill, which required significant actual emissions reductions from coal-fired power plants in North Carolina. Under the act, power plants must reduce their NO_x emissions by 77% in 2009 and their SO_2 emission by 73% in 2013. Actions taken to date by facilities subject to these requirements comply with the provisions of the Clean Smokestacks Act, and compliance plans and schedules will allow these entities to achieve the emissions limitations set out by the Act. This program has been highly

successful. In 2009, regulated entities emitted less than the 2013 system annual cap of 130, 000 tons of SO_2 and less than the 2009 system annual cap of 56,000 tons of NO_x.

1.4.b Georgia Multi-Pollutant Control for Electric Utility Steam Generating Units

Georgia rule 391-3-1.02(2)(sss), enacted in 2007, requires FGD and SCR controls on coal-fired EGUs in Georgia. These controls will reduce SO_2 emissions from the affected emissions units by at least 95 percent and will reduce NO_x emissions by approximately 85 percent. Control implementation dates vary by EGU, starting on December 31, 2008.

1.4.c. Maryland Healthy Air Act

The Maryland Healthy Air Act (HAA) regulations became effective on July 16, 2007 and required reductions in NO_x, SO_2, and mercury emissions from large coal burning power plants in Maryland. Emission reductions from the HAA come in two phases. The first phase required reductions in the 2009/2010 timeframe, and compared to a 2002 emission baseline, reduced NO_x emission by almost 70 percent and SO_2 emission by 80 percent. The second phase of emissions controls occurs in the 2012/2013 time frame. At full implementation, the HAA will reduce NO_x emissions by approximately 75 percent from 2002 levels and SO_2 emissions by approximately 85 percent from 2002 levels. Maryland is not a VISTAS participant. However, Maryland borders West Virginia and Virginia, two VISTAS states, and Maryland facilities have calculated sulfate visibility impairment contributions to several VISTAS Class I areas. The first phase of the HAA was successfully implemented, and the second phase of the program is expected to be implemented in a timely manner. Reductions associated with this program were included as part of the VISTAS 2018 "Best and Final" modeling effort.

1.5. Review of BART Determinations

The VISTAS "Best and Final" 2018 emissions inventories contained emissions reductions expected to be achieved from BART determinations made by the member States. The results of the BART determinations for facilities located in West Virginia are listed in Table 9. Table 10 lists the BART determinations made in other States within a 300 km radius of the Dolly Sods and Otter Creek Wilderness areas.

1.5.a. West Virginia BART Sources

Table 9: Summary of West Virginia BART Requirements					
Summary of BART Exemption Requirements for PPG (54-051-00002)					
Unit: *#5 Boiler*	**Unit ID:** *003*	**Pollutant:** *SO_2*	**Control Method:** *Multiple*	**Overall Control Efficiency:** *58%*	**BART Limit:** *1478.8 lbs/hr*
MRR Requirements	*Compliance with the Boiler 5 emission limits shall be determined by the use of a CEMS. The CEMS shall be installed, operated, maintained and certified as accurate under the applicable requirements of 40CFR60. The date, time and duration of all non-compliance shall be recorded and submitted to the Director in compliance with 45CSR10.*				
Other Permit Requirements	*Total SO_2 emissions from Boilers 3, 4 and 5 (Unit ID 002, 001 and 003, respectively) shall not exceed 3766.8 lb/hr.*				
Compliance Date	*May 1, 2008*				
Summary of BART Requirements for Mt. Storm (54-023-00003)					
Unit: *Unit 1*	**Unit ID:** *001*	**Pollutant:** *PM10 (filterable)*	**Control Method:** *ESP & FGD*	**Overall Control Efficiency:** *99.50%*	**BART Limit:** *0.03 lb/mmBtu (filterable)*
MRR Requirements	*The permittee shall calculate the potential particulate matter emissions from Unit 1, Unit 2, and Unit 3 on a daily basis using the monitoring procedures and calculation methodology outlined in the 45CSR2 monitoring plan.* *The permittee shall record any instance of calculated emissions in excess of the limits given under Section 4.1 of this permit and any corrective actions therefore taken.* *The permittee shall maintain and operate, at all reasonable times, appropriate equipment on the ESP and FGD to continuously monitor the performance of each control device.* *PM_{10} testing on 45CSR2 schedule.*				
Other Permit Requirements	*Aggregate 99.50% PM_{10} removal efficiency on ESP & FGD*				
Compliance Date	*December 13, 2007*				

Table 9: Summary of West Virginia BART Requirements					
Summary of BART Requirements for Mt. Storm (54-023-00003)					
Unit: Unit 2	**Unit ID:** *0012*	**Pollutant:** *PM_{10} (filterable)*	**Control Method:** *ESP & FGD*	**Overall Control Efficiency:** *99.50%*	**BART Limit:** *0.03 lb/mmBtu (filterable)*
MRR Requirements	*Same as Unit 1*				
Other Permit Requirements	*Aggregate 99.50% PM_{10} removal efficiency on ESP & FGD*				
Compliance Date	*December 13, 2007*				
Summary of BART Requirements for Mt. Storm (54-023-00003)					
Unit: *Unit 3*	**Unit ID:** *0013*	**Pollutant:** *PM_{10} (filterable)*	**Control Method:** *ESP & FGD*	**Overall Control Efficiency:** *99.50%*	**BART Limit:** *0.03 lb/mmBtu (filterable)*
MRR Requirements	*Same as Unit 1*				
Other Permit Requirements	*Aggregate 99.50% PM_{10} removal efficiency on ESP & FGD*				
Compliance Date	*December 13, 2007*				
Summary of BART Requirements for Capitol Cement (54-003-00006)					
Unit: *#9 Kiln*	**Unit ID:** *012*	**Pollutant:** *SO_2, NO_x, PM_{10}*	**Control Method:** *Shut Down*	**Overall Control Efficiency:** *N/A*	**BART Limit:** *N/A*
MRR Requirements	*Confirm shutdown of kiln*				
Other Permit Requirements	*N/A*				
Compliance Date	*Shutdown #9 Kiln within 180 days of startup of the new ph-pc kiln, or before BART Compliance deadline, whichever comes first. Kilns 7, 8 and 9 were shutdown in 2009.*				

1.5.b. Review of Other States BART Analyses for Sources Impacting Dolly Sods

Maryland was identified in the WV Regional Haze SIP as contributing 11.81% to sulfate at Dolly Sods, with 9.86% of the sulfate attributable to two (2) units, one of which was subject to BART, at the New Page facility located in Luke, Maryland. WVDEP had consulted with the Maryland Department of the Environment (MDE) prior to submittal of the WV Regional Haze SIP, and MDE indicated that they expected the New Page facility to install a scrubber with at least a 90% control efficiency on at least one of the two units impacting Dolly Sods. Maryland had not finalized their BART process when the WV Regional Haze SIP was submitted to EPA on June 18, 2009. Maryland submitted their Regional Haze SIP, which contained their BART analyses and limits for the New Page facility, to EPA on February 9, 2012.

Table 10: Summary of Other States BART Requirements for Units Significantly Impacting Dolly Sods					
Summary of BART Requirements for New Page/Westvaco/Luke Paper (24-011-0011)					
Unit: Power Boiler 25	**Unit ID:** 2	**Pollutant:** SO_2	**Control Method:** *Multiple*	**Overall Control Efficiency:** *90%*	**BART Limit:** 892.3 tpy
MRR Requirements	*Compliance with the emission limits shall be demonstrated by annual emission certificates*				
Other Permit Requirements	*Total SO_2 emissions shall not exceed 10% of the 2002 baseline emissions.*				
Compliance Date	*Within 5 years of SIP approval.*				
Unit: Power Boiler 25	**Unit ID:** 2	**Pollutant:** NO_x	**Control Method:** *Multiple*	**Overall Control Efficiency:** *46.1%*	**BART Limit:** 0.4 lb/MMBtu
MRR Requirements	*Compliance with the emission limits shall be demonstrated by annual emission certificates*				
Other Permit Requirements	*Total NO_x emissions shall not exceed the BART Emission Limit.*				
Compliance Date	*Within 5 years of SIP approval.*				
Unit: Power Boiler 25	**Unit ID:** 2	**Pollutant:** PM	**Control Method:** *Multiple*	**Overall Control Efficiency:** *32%*	**BART Limit:** 103.75 tpy
MRR Requirements	*Compliance with the emission limits shall be demonstrated by annual emission certificates*				
Other Permit Requirements	*Total NO_x emissions shall not exceed the BART Emission Limit.*				
Compliance Date	*Within 5 years of SIP approval.*				

1.6. Reasonable Progress Determinations

Regional air quality modeling projected that reductions in SO_2 from EGU and non-EGU point sources would result in the greatest improvements in visibility at VISTAS Class I areas. Therefore, for this first round of regional haze planning, VISTAS chose to focus reasonable progress evaluations on potential SO_2 emission controls from these source sectors. To select the specific point sources that would be considered for each Class I area, states first identified the geographic areas that most likely influenced visibility in each Class I area and then identified the major SO_2 point sources in that geographic area, this area was defined as the SO_2 Area of Influence (AoI). VISTAS created detailed spreadsheets identifying SO_2 emission by stack, distance from Class I areas, and estimated sulfate extinction-weighted residence times.

To further aid in the reasonable progress analyses, AirControlNET results were used. AirControlNET, a control technology analysis tool developed to support the USEPA in its analyses of air pollution policies and regulations, provided data on emission sources, potential pollution control measures, emission reductions, and the costs of implementing those controls. Every available SO_2 control strategy in AirControlNET was run against the EGU and non-EGU point source inventories to develop a master list of available, increment control strategies for VISTAS states to use in reasonable progress controls development. States reviewed stacks with an estimated calculated sulfate visibility contribution of at least 1 percent to any Class I area to determine if further SO_2 controls were feasible. West Virginia used a benchmark of approximately $2,000/ton of pollutant removed to determine economic feasibility. Units identified by AirControlNET as potentially having the opportunity for cost-effective control installation were asked to submit a reasonable progress four factor analysis. More detail on the methodology of the VISTAS reasonable progress analysis may be found in Appendix H of West Virginia's Regional Haze SIP.

After review of all data, West Virginia determined that one stack at one facility required further analysis to satisfy reasonable progress requirements during this round of regional haze planning. The only non-EGU identified as contributing greater than 1% to sulfate visibility impairment at a Class I area was Capitol Cement, with a 1.27% contribution to sulfate visibility impairment at Shenandoah.

Capitol Cement is a portland cement manufacturing facility located in Martinsburg, WV. In 2002, ESSROC acquired Riverton Investment Corporation which operated Capitol Cement. Capitol Cement then applied for a permit to modernize operations at the facility by replacing certain existing operations and increasing overall plant production capacity. The modernization project included the replacement of two existing long wet process cement kilns (Kilns 8 and 9) and associated clinker coolers with a modern large precalciner kiln system and related equipment. (The modernization project was completed in 2009, both Kilns 8 and 9 were replaced.) Kiln 7, a long wet process kiln, was to remain at the facility and to make a limited amount of clinker, including certain specialty (colored) clinkers.

The modernization project at Capitol Cement was subject to both minor source and major source permitting requirements, and was required to undergo PSD permitting. Permit R14-026 was issued for the project on June 2, 2005. Under the conditions of permit R14-026 the SO_2 limit for Kiln 7 was reduced to 900 tpy; actual SO_2 emissions in 2002 from Kiln 7 were 1,247 tons and projected SO_2 emissions for 2018 were 1,717 tons.

Since the cost of compliance for an FGD on Kiln 7 was more than 12 times greater than the cost effectiveness benchmark, and the facility had taken permit limits to reduce emissions and limit operations of Kiln 7, the WVDEP determined that there were no additional cost effective SO_2 controls available. The reasonable progress analysis results were not known at the time of the "Best and Final" Modeling inventory development. Therefore, Kiln 7 emissions were modeled at 1,717 tons of SO_2 emissions for the final 2018 modeling effort. Capitol Cement subsequently shutdown Kiln 7 in 2009.

2. EMISSION CONTROL MEASURES NOT INCLUDED IN THE SIP

Since development of the WV Regional Haze SIP, a number of regulations and requirements have been developed that were not included in 2018 estimates. The sections below provide information on these requirements, and where possible, estimates of additional reductions are provided. These reductions provide extra assurances that the Dolly Sods and Otter Creek Wilderness Areas will meet their reasonable progress goals in a timely manner.

2.1. Mercury and Air Toxics Rule

On December 16, 2011, the EPA finalized national CAA standards to reduce mercury and other toxic air pollution from coal- and oil-fired power plants. National Emission Standards for Hazardous Air Pollutants From Coal-Fired and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units [77 FR 9304] was published in the Federal Register on February 16, 2012, with an effective date of April 16, 2012. The final rule established power plant emission standards for mercury, acid-gases, and non-mercury metallic toxic pollutants that will prevent 90 percent of the mercury in coal burned in power plants from being emitted into the air; reduce by 88 percent the acid gas emissions from power plants; and cut power plant SO_2 emissions by 41 percent beyond the reductions expected from CSAPR. These reductions are expected in the 2016 timeframe.

On August 2, 2012, [77FR45967] the EPA issued a partial stay of the effectiveness of the national new source emission standards for hazardous air pollutants from coal- and oil-fired utility steam generating units issued pursuant to Clean Air Act section 112 that were published in the Federal Register on February 16, 2012 [77 FR 9304].

On November 30, 2012, [77 FR 71323] the EPA proposed to update emission limits for new power plants under the Mercury and Air Toxics Standards (MATS). The updates would only apply to future power plants; would not change the types of state-of-the-art pollution controls that they are expected to install' and would not significantly change costs or public health benefits of the rule.

2.2. 2010 SO_2 NAAQS

On June 2, 2010, the EPA strengthened the primary NAAQS for SO_2 by revising the primary SO_2 standard to 75 ppb averaged over one hour. This short term standard is significantly more stringent than the revoked standards of 140 ppb averaged over 24 hours and 30 ppb averaged over a year. Under the new standard, facilities with significant emissions of SO_2, many of which are EGUs, will be required to demonstrate compliance with the standard no later than 2017. Pursuant to the CAA, states are required to submit such demonstrations 18 months from the date of designation of a nonattainment area. The current schedule for the finalization of nonattainment areas for SO_2 is June 2013.

West Virginia recommended in its letter to EPA on May 23, 2011 that five counties (Brooke, Hancock, Marshall, Monongalia, and Wood) be designated as nonattainment for the 2010 primary SO_2 NAAQS based on monitoring data for the period 2008-2010. In these counties, one facility has actual SO_2 emissions of 191 tons per year and the remaining ten facilities have actual SO_2 emissions greater than 500 tons per year. In the remaining fifty WV counties recommended either as attainment or unclassifiable, twenty-five sources have actual SO_2 emissions greater than 100 tons per year.

EPA plans to use a combination of monitoring and modeling to assess compliance with the 1-hour SO_2 standard. EPA has proposed implementation and modeling guidance and held stakeholder meetings to gather additional information to develop additional guidance and/or a final rule. These additional stakeholder discussions signaled the need to further develop the guidance to include potential alternatives to modeling for designations and compliance.

WV DEP will follow EPA guidance to determine compliance with the NAAQS for SO_2. DEP will initially focus on the nonattainment areas to determine whether sources of SO_2 emissions will need additional emissions controls or other emissions reduction measures to attain the NAAQS. EPA modeling results detailed in a May 28, 2010 memo placed in the SO_2 NAAQS Review Docket indicate the potential that some facilities will likely need additional control measures. Any additional reductions in SO_2 emissions will enhance protection of visibility, especially in Federal Class I areas.

2.3. North American Emission Control Area

On March 26, 2010, the International Maritime Organization officially designated waters off North American coasts as an area in which stringent international emission standards will apply to ships. These standards will reduce air pollution from ships and deliver air quality benefits that extend hundreds of miles inland. In 2020, EPA expects emissions from ships operating in the designated area to be reduced by 320,000 tons for NO_x, 90,000 tons for $PM_{2.5}$, and 920,000 tons for SO_2, which is 23 percent, 74 percent, and 86 percent, respectively, below predicted levels in 2020 absent the Emissions Control Area designation.

Implementation of the Emission Control Area means that ships entering the designated area would need to use compliant fuel for the duration of their voyage that is within that area, including time in port as well as voyages whose routes pass through the area without calling on a port. The requirements for quality of fuel change over time. From the effective date in 2012 until 2015, the sulfur content of fuel used by all vessels operating in designated areas cannot exceed 10,000 ppm. Beginning in 2015, the sulfur content of fuel used by vessels operating in these areas cannot exceed 1,000 ppm. With regard to NO_x emissions, marine diesel engines installed on a ship constructed on or after January 1, 2011 must comply with the "Tier II" standard. Marine diesel engines installed on a ship constructed on or after January 1, 2015 will be required to comply with the more stringent "Tier III" NO_x standard.

2.4. Residual Risk Requirements

The Clean Air Act requires the EPA to assess the risk remaining after application of final technology-based air toxics standards to any source category within 8 years of setting the technology based MACT standards. In the residual risk process, the EPA must assess the remaining health risks from each source category to determine whether the MACT standards provide an ample margin of safety to protect public health and protect against adverse environmental effects. Final rules for this Clean Air Act requirement are expected for 28 source categories between 2011 and 2013. Additional requirements to reduce toxic air emissions under the residual risk assessment may also have co benefits for the reduction of VOC and other criteria pollutant emissions between now and 2018.

2.5. Control Technique Guidelines

The federal Clean Air Act (§ 172(c)(1)) provides that SIPs for nonattainment areas must include reasonably available control techniques RACT for control of emissions that contribute to the formation of ozone air pollution. Section 182(b)(2) provides that for certain nonattainment areas, states must revise their SIPs to include RACT for sources of VOC emissions covered by a control techniques guidelines document (CTG). Section 183(e) then directs the EPA to list for regulation those categories of products that account for at least 80 percent of the VOC emissions from commercial products in ozone nonattainment areas.

RACT controls for source categories controlled by a CTG are known as CTG RACTs. CTG RACTs have been issued for various printing, coating, and cleaning operations. In 2006, 2007, and 2008, USEPA published CTGS as listed in Table 11. These regulations, which must be implemented in ozone nonattainment areas and the Ozone Transport Region within 1 year of becoming final, will reduce emissions of VOCs from areas in which they are required.

Table 11: CTGs Promulgated in 2006, 2007 and 2008

Category	EPA Document Number
Industrial Cleaning Solvents	EPA-453/R-06-001
Offset Lithographic Printing and Letterpress Printing	EPA-453/R-06-002
Flexible Package Printing	EPA-453/R-06-003
Flat Wood Paneling Coatings	EPA-453/R-06-004
Paper, Film, and Foil Coatings	EPA-453/R-07-003
Large Appliance Coatings	EPA-453/R-07-004
Metal Furniture Coating	EPA-453/R-07-005
Miscellaneous Metal and Plastic Parts Coatings	EPA-453/R-08-003

Table 11: CTGs Promulgated in 2006, 2007 and 2008	
Category	**EPA Document Number**
Fiberglass Boat Manufacturing Materials	EPA-453/R-08-004
Miscellaneous Industrial Adhesives	EPA-453/R-08-005
Automobile and Light-Duty Truck Assembly Coatings	EPA-453/R-08-006

2.6. Federal Consent Decrees

- INVISTA S.à.r.l. (INVISTA) [US District Court for the District of Delaware]: On April 13, 2009, INVISTA agreed to limit its emissions at the Camden, South Carolina facility such that two of its boilers will comply with a combined NO_x emissions limit of 202 tons on a 12-month rolling average basis by converting one boiler to natural gas controlled with selective catalytic reduction (SCR) technology, and installing a Mobotec with Rotamix designed to reduce NO_x emissions by 65 percent on an additional boiler. SO_2 emissions from the natural gas boiler will be limited to 1 ton on a 12-month rolling average basis. INVISTA has also committed to limit sulfur content in all vaporized fuel to 1 percent. (INVISTA is subject to BART but refined modeling analysis conducted as part of the SC Regional Haze SIP effort indicated that emissions were below the contribution threshold established.) The changes at the Camden facility were required to be completed by December 31, 2011.

- Dupont/Lucite [US District Court for the Southern District of West Virginia]: On April 20, 2009 DuPont and Lucite International Inc. agreed to pay a $2 million civil penalty to settle Clean Air Act violations at a sulfuric acid plant in Belle, WV. The companies chose, on their own, to shut down the sulfuric-acid manufacturing unit and the settlement confirms that agreement. Under the settlement the sulfuric acid unit was required to shutdown by April 1, 2010. In 2002 emissions from the sulfuric acid unit included 960 tons of SO_2, and 52 tons of NO_x. The sulfuric acid unit was shutdown in 2010, as required.

- Tennessee Valley Authority [Federal Facilities Compliance Agreement]: On April 14, 2011, the EPA announced a settlement with the Tennessee Valley Authority (TVA) to resolve alleged Clean Air Act violations at 11 of its coal-fired plants in Alabama, Kentucky and Tennessee. The settlement requires TVA to invest $3 billion to $5 billion on new and upgraded state-of-the-art pollution controls. Once fully implemented, the pollution controls and other required actions will address 92 percent of TVA's coal-fired power plant capacity, reducing NO_x by 69 percent and SO_2 by 67 percent from TVA's 2008 emissions levels.

2.7. West Virginia Unit Specific Point Source Reductions

Table 12 provides information on units that have shutdown or otherwise installed controls that did not have the associated 2018 emissions reductions included in the WV Regional Haze SIP. These facilities accounted for 17,057 tons and 15,631 tons of SO_2 emissions in 2002 and 2007, respectively and were projected to emit 22,105 tons of SO_2 in 2018.

Table 12: Unit Specific Reductions Not Included in the WV Regional Haze SIP

Facility Data					SO_2 Emissions		
Facility	**ID**	**Unit(s)**	**Comment**	**Current Status**	**2002 Emissions (tpy)**	**2007 SEMAP Emissions (tpy)**	**2018 Projected Emissions (tpy)**
North Branch	023-0014	All	Dominion Warrant County NSR Permit issued by Virginia required shutdown, last operated 2009	Shutdown	519	1,034	2,022
Cabot	073-0006	All	Shutdown 2008	Shutdown	6,961	4,219	9,586
Columbian Chemical	051-0019	All	Shutdown 2009	Shutdown	795	2,487	1,100
Capitol Cement	003-0006	Kiln 7	Shutdown 2009	Shutdown	1,246	5,147	1,717
DuPont, Belle	039-0001	Sulfuric Acid Recovery Unit	Shutdown 2010	Shutdown	960	1,059	1,147
WV Alloys, Inc	019-0001	Boiler 4	Last operated 2007	Shutdown	1,937	482	1,922
FMC	039-0002	All	Last operated in 2003, Demolished in 2007	Shutdown	854	0	848
Dow	039-0003	Boiler 25	Coal boiler replaced by gas boiler in 2011	Shutdown	1,009	925	1,001
Braskem	099-0010	Coal boilers	Coal boilers replaced by gas boilers in 2010	Shutdown	284	278	282
Cytec	073-0003	Coal boilers	Coal boilers replaced by gas boilers in 2005	Shutdown	2,438	0	2,419
Herndon Processing	109-0002	Thermal Dryer	Last operated 2006, Demolished 2011	Shutdown	54	0	61
East Gulf Prep Plant	081-0012	Thermal Dryer	Last operated 2007	Shutdown	9	31	10
Totals					**17,057**	**15,631**	**22,105**

3. SUMMARY OF EMISSIONS REDUCTIONS ACHIEVED
[40CFR 51.308(g)(2)]

40 CFR 51.308(g)(2) of the RHR requires "A summary of the emissions reductions achieved throughout the State through implementation of the measures in paragraph (g)(1)."

As in the original SIP submittal, this periodic update is focused on sulfates, the largest contributor to visibility impairment. Overall SO_2 emissions have decreased in West Virginia.

3.1. EGU Reductions

Table 16 (in Section C.3.3) lists all EGU units in West Virginia and shows the controls assigned to the units in 2018 as part of the "Best and Final" modeling effort, the current status of those control assignments, estimated tons of SO_2 emissions reduced (2009-2002) and actual 2011 emissions from those units, where available from EPA's Clean Air Markets Division. Table 13 lists any EGU having a calculated visibility impact on Dolly Sods and Otter Creek Wilderness areas of 0.5 percent based on the analysis in Section C.7 and Appendix H.2 of the WV Regional Haze SIP, the current SO_2 controls, and the 2002 - 2011 actual emissions for those units.

This source sector has been shown to be a major contributor to visibility impairment in the VISTAS Class I areas, including Dolly Sods and Otter Creek. Very good progress has been made towards reducing SO_2 emissions from this sector. Additional reductions beyond those assumed in the "Best and Final" modeling are expected to be realized by 2018, further improving visibility at Class I areas.

The large reductions in SO_2 emissions from electric generating units during 2009 resulted from many factors, including control installations, units switching to cleaner fuels, load shifting from dirtier units to cleaner units, and an overall decrease in demand for generation. CAMD data for Acid Rain Program units from 2002 through 2011 indicate that reductions in SO_2 emissions appear to be maintained, and further reductions achieved, even though heat input to these units increased between 2009 and 2011. This is generally true for EGUs in West Virginia and across the VISTAS states.

Figure 10 depicts the trends for West Virginia's Acid Rain Program units that reported emissions to CAMD. Between 2002 and 2011, heat input to these units decreased by 159,460 MMBtu (17.7% decrease from 2002 level) to 741,020 MMBtu. Actual SO_2 emissions from these units decreased by 414,501 tons (81.7% decrease from 2002 level) to 92,609 tons, while the average SO_2 emission rate decreased from 1.126 lb/MMBtu to 0.250 lb/MMBtu, a 77.8% decrease. Although there was a slight decrease in heat input, 17.7 % between 2002 and 2011, there were significantly larger decreases in both the tons of SO_2 emissions and the SO_2 emission rate, 81.7% and 77.8%, respectively. This significant decrease in emissions with a slight decrease in heat input is indicative of the fact that the reductions are the result of the installation of controls and the use of cleaner burning fuels.

A comparison of 2009 and 2011 heat input and SO_2 emissions for West Virginia shows an increase in heat input from 672,741 MMBtu to 741,020 MMBtu (10.1% increase), while SO_2 emissions dropped from 174,583 tons to 92,609 tons (a 47.0% decrease), and the SO_2 emission rate dropped

dropped from 174,583 tons to 92,609 tons (a 47.0% decrease), and the SO_2 emission rate dropped from 0.519 lb/MMBtu to 0.250 lb/MMBtu (a 51.8% decrease). The overall SO_2 emission rate in West Virginia is expected to continue to drop due to the planned shutdown of older, uncontrolled units and load switching to cleaner units. Figure 11 shows the trend in SO_2 reductions.

Table 13. Status and Emissions of EGUs outside of West Virginia with a Calculated Visibility Impact of greater than 0.5% on Dolly Sods

Facility (State)	ORIS ID	Unit	Current SO_2 Controls	2002 SO_2 Emissions (tons)	2007 SO_2 Emissions (tons)	2011 SO_2 Emissions (tons)
Muskingum River (OH)	2872	B006 (Unit 5)	--	30,401.0	36,550.1	19,487.4
Gavin (OH)	8102	B003 (Unit 1)	Scrubber	18,856.3	15,643.6	17,200.1
Gavin (OH)	8102	B004 (Unit 2)	Scrubber	13,523.8	13,520.2	16,064.7
Totals				**62,781.1**	**65,713.9**	**52,752.2**

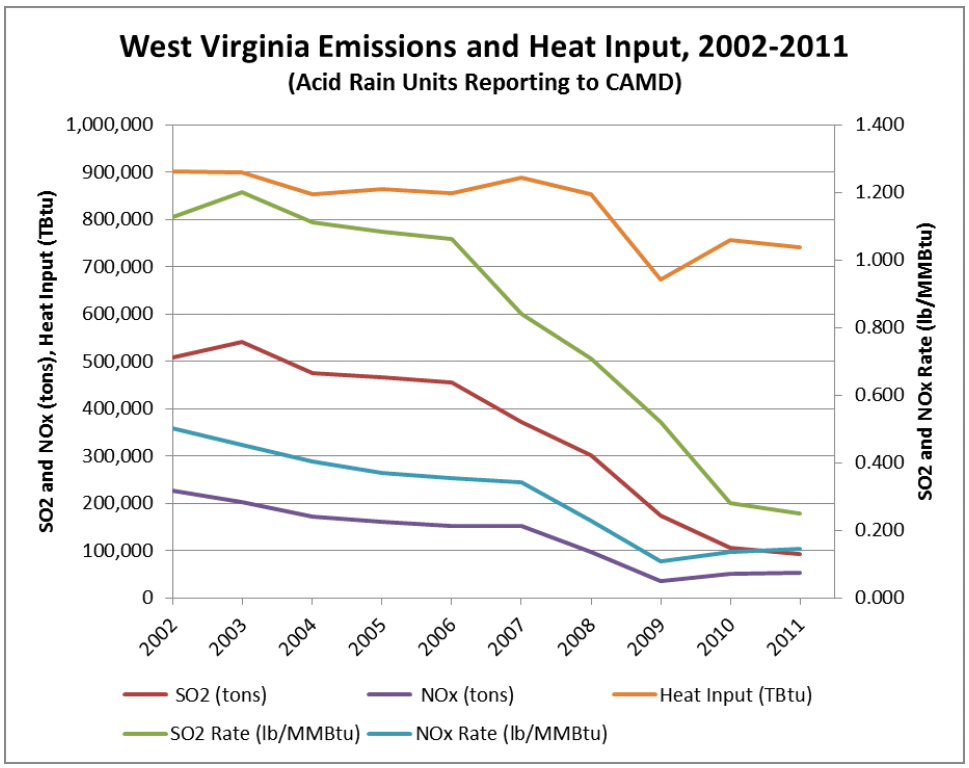


Figure 10. West Virginia EGU Emissions and Heat Input, 2002-2011.
(Source: CAMD database http://ampd.epa.gov/ampd/QueryToolie.html)

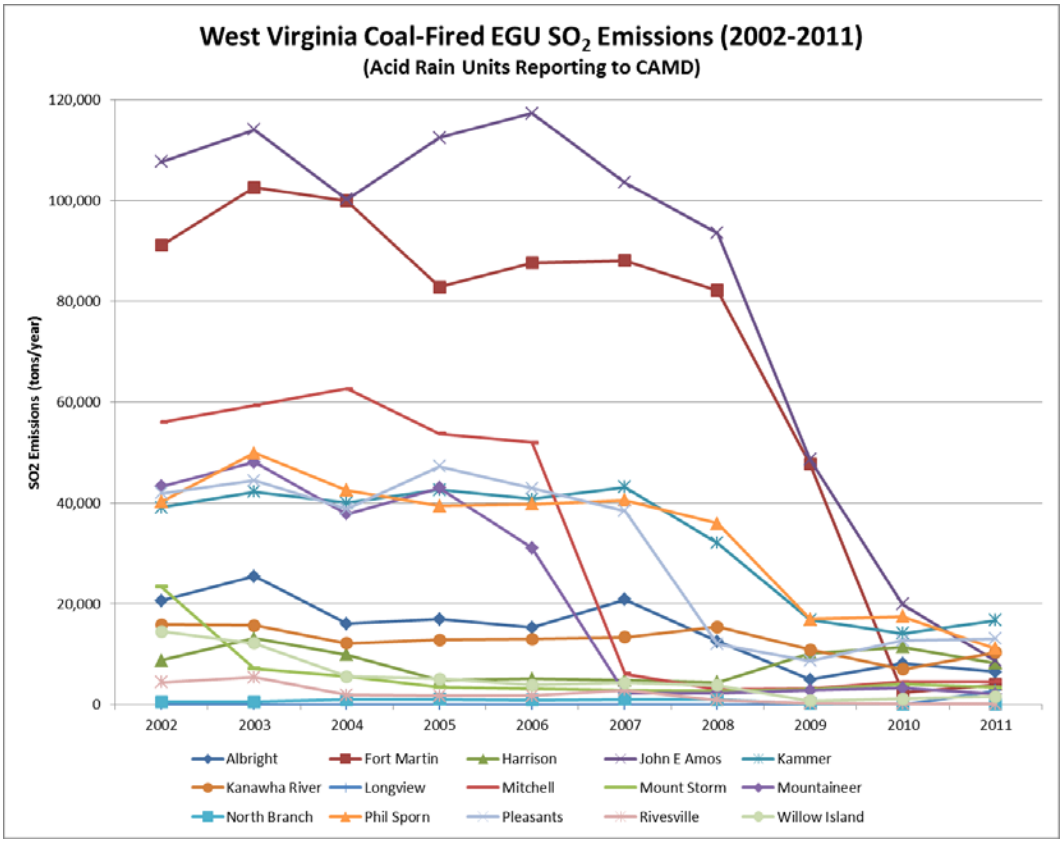


Figure 11. West Virginia Coal-Fired EGU SO_2 Emissions, 2002-2011.
(Source: CAMD database http://ampd.epa.gov/ampd/QueryToolie.html)

Figure 12 shows the trends for the Acid Rain Program units across all VISTAS states. Between 2002 and 2011, heat input from these units decreased from 7,646,738 TBtu to 7,336,124 TBtu, a decrease of 4.1 percent. SO_2 emissions from these units decreased from 3,713,263 tons to 1,166,586 tons, a decrease of 68.6 percent, and the average SO_2 emission rate decreased from 0.971 lb/MMBtu to 0.318 lb/MMBtu, a decrease of 67.3 percent. As additional controls are installed to meet the more stringent requirements of CSAPR and MATS, this emission rate is expected to continue to decline.

A comparison of 2009 and 2011 heat input and SO_2 emissions for the VISTAS states shows an increase in heat input from 6,966,868 TBtu to 7,336,214 TBtu (5.3% increase), while SO_2 emissions dropped from 1,619,342 tons to 1,166,586 tons (a 28.0% decrease), and the SO_2 emission rate dropped from 0.465 lb/MMBtu to 0.318 lb/MMBtu (a 31.6% decrease).

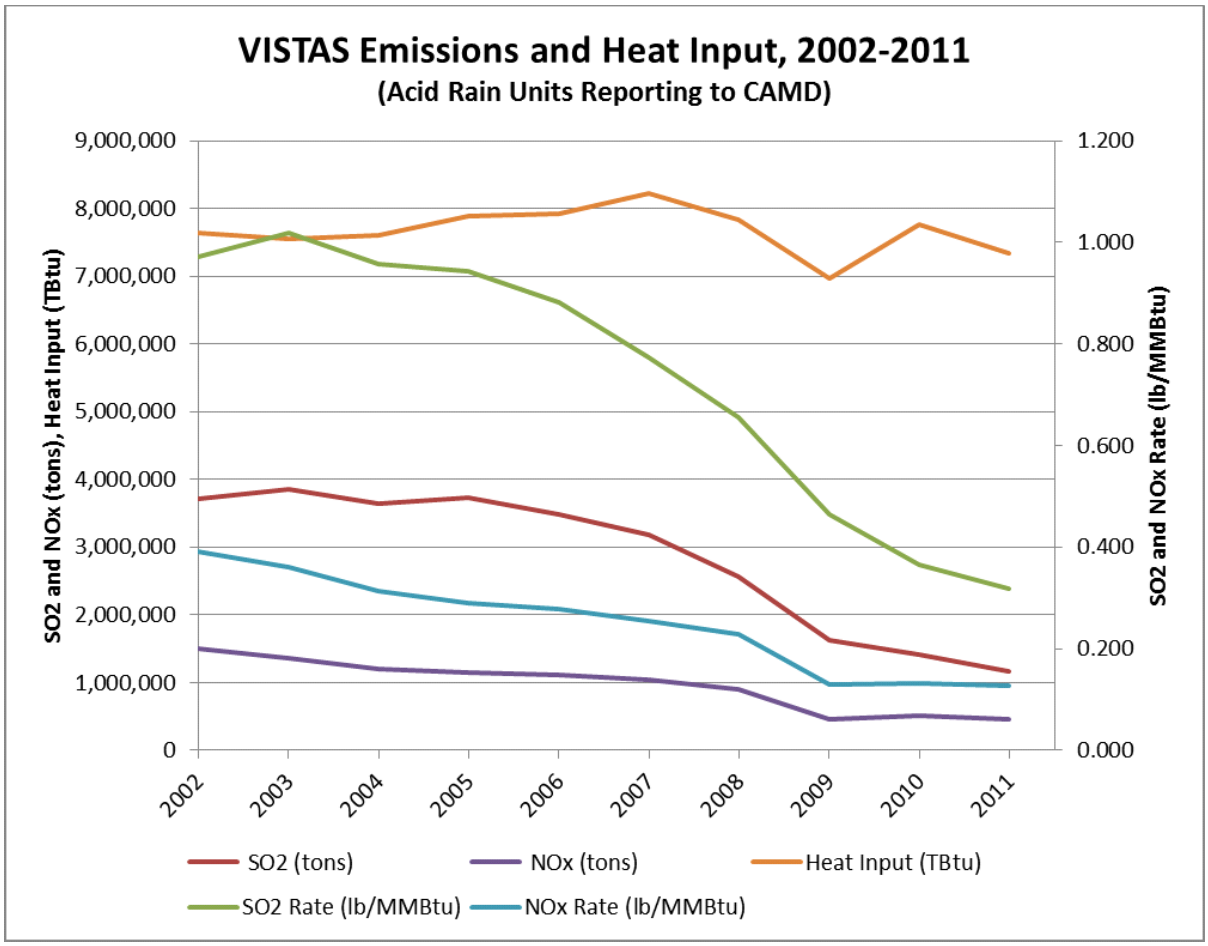


Figure 12 VISTAS EGU Emissions and Heat Input, 2002-2011.
(Source: CAMD database http://ampd.epa.gov/ampd/QueryToolie.html)
(SO_2 Rate calculated by taking state Acid Rain Program (ARP) SO_2 emissions divided by state ARP heat input.)

Since sulfates have been shown to be the predominant species of concern to visibility impairment at Dolly Sods and Otter Creek for the first round of regional haze planning, visibility improvements from reduced sulfate contribution should continue into the future even as demand for power, and therefore heat input, increase. Table 17 summarizes this data for West Virginia and the VISTAS states.

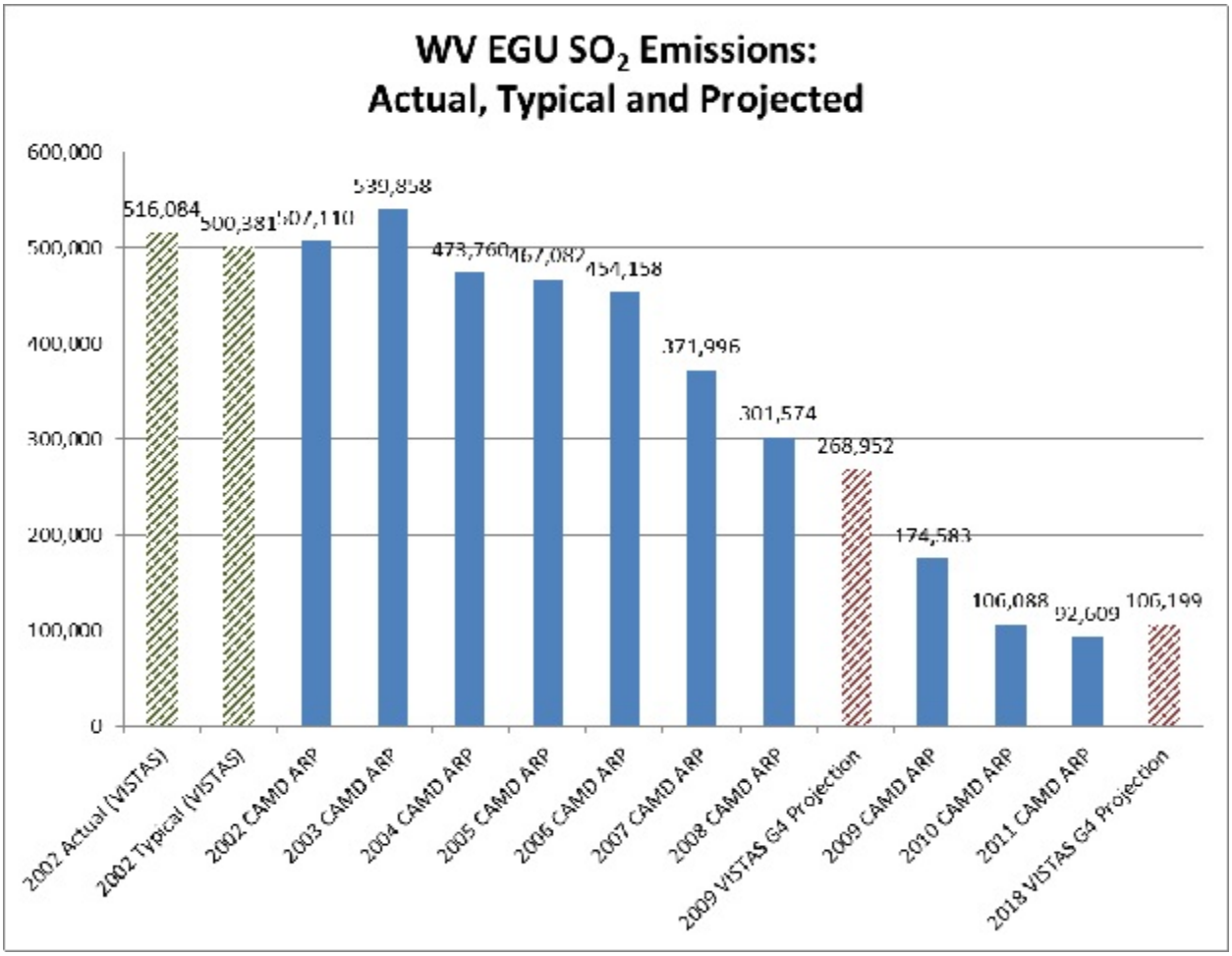
Table 14: Summary of Acid Rain Program SO_2 Emission and Heat Input Data for 2002-2011 for VISTAS States and West Virginia						
Year	VISTAS States			West Virginia		
	Heat Input (TBtu)	SO_2 Emissions (tons)	SO_2 Rate (lb/MMBtu)	Heat Input (TBtu)	SO_2 Emissions (tons)	SO_2 Rate (lb/MMBtu)
2002	7,646,738	3,713,263	0.971	900,479	507,110	1.126
2003	7,550,082	3,846,147	1.019	899,861	539,858	1.200
2004	7,601,334	3,635,738	0.957	852,042	473,760	1.112
2005	7,894,071	3,725,196	0.944	863,343	467,082	1.082
2006	7,921,256	3,489,194	0.881	855,832	454,158	1.061
2007	8,218,000	3,175,353	0.773	887,129	371,996	0.839
2008	7,833,777	2,565,907	0.655	853,266	301,574	0.707
2009	6,966,868	1,619,342	0.465	672,741	174,583	0.519
2010	7,762,801	1,415,701	0.365	755,444	106,088	0.281
2011	7,336,214	1,166,586	0.318	741,020	92,609	0.250

Source: USEPA CAMD data for Acid Rain Program units. http://ampd.epa.gov/ampd/QueryToolie.html
(SO_2 Rate calculated by taking state Acid Rain Program (ARP) SO_2 emissions divided by state ARP heat input.)

3.2. Additional EGU SO_2 Emission Reductions

As depicted in Figure 13, West Virginia's 2009 EGU SO_2 emissions, as reported to CAMD, are well below the 2009 modeled values. In fact, actual EGU SO_2 emissions as reported to CAMD are below both the VISTAS 2009 and 2018 projections for 2009, 2010 and 2011.

As shown in Tables 9 and 10, several EGUs in West Virginia have seen marked decreases in SO_2 emissions over the past several years. In fact, as shown in Table 9, all coal-fired EGUs in West Virginia have shown a decrease in SO_2 emissions from 2002 to 2011. As shown in Table 10, in addition to the shutdown of 5 units (Albright 1 & 2, Rivesville 7 & 8, and Willow Island 1) that were projected by IPM to be shutdown by 2018 in the WV Regional Haze SIP, AEP has announced (http://www.aep.com/newsroom/newsreleases/?id=1697) the shutdown of Kanawha River 1 & 2, Kammer 1, 2, & 3, and Philip Sporn 11, 21, 31,41 and 51 by 2015, and First Energy shutdown Albright 3, and Willow Island 2 in 2012 (https://www.firstenergycorp.com/content/fecorp/newsroom/news_releases/firstenergy_citingimpactofenvironmentalregulationswillretirethre.html).



Note: The VISTAS 2002 Actual and 2002 Typical emissions, and the VISTAS 2009 and 2018 projections include the SO_2 emissions for the entire facility, while the CAMD emissions include just the boiler SO_2 emissions as reported to CAMD. The actual 2002 VISTAS inventory reflects the base year emissions that correspond to the meteorological data used in the modeling effort, in this case, 2002. These emissions were used for evaluating air quality model performance. The 2002 typical VISTAS inventory is similar to the actual base year. However, for sources that may have significant emissions changes from year to year, a more typical emission value was used. Typical emissions were developed for the electric generating units (EGUs) and the wildfire emissions.

Figure 13. WV EGU SO_2 Emissions, Actual, Typical and Projected

Table 15. WV EGU SO_2 Emissions (tons)											
ORIS ID	**Facility**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
3942	Albright	20,560	25,425	15,985	16,923	15,229	20,793	12,497	4,889	8,128	6,453
3943	Fort Martin	91,119	102,522	99,869	82,821	87,565	88,032	82,092	47,656	2,444	3,953
3944	Harrison	8,691	13,145	9,869	4,765	5,063	4,738	4,421	10,186	11,392	8,166
3935	John E Amos	107,619	114,018	100,153	112,412	117,299	103,546	93,540	48,568	19,868	8,610
3947	Kammer	39,096	42,216	40,016	42,574	40,750	43,127	32,044	16,756	14,127	16,712
3936	Kanawha River	15,862	15,686	12,171	12,851	12,994	13,384	15,426	10,856	6,996	10,337
56671	Longview	0	0	0	0	0	0	0	0	0	2,733
3948	Mitchell	56,009	59,331	62,617	53,765	52,005	6,084	3,019	3,173	4,448	4,518
3954	Mount Storm	23,370	7,134	5,564	3,471	3,139	2,773	2,663	3,062	4,025	3,425
6264	Mountaineer	43,224	48,036	37,823	42,982	31,052	2,302	2,248	2,768	3,247	2,009
7537	North Branch	519	559	987	1,073	867	1,034	996	111	0	0
3938	Phil Sporn	40,246	49,891	42,474	39,375	39,741	40,530	35,926	16,941	17,469	11,041
6004	Pleasants	41,909	44,396	38,782	47,203	42,867	38,438	12,015	8,670	12,684	13,033
3945	Rivesville	4,412	5,356	1,922	1,769	1,725	2,884	900	186	129	42
3946	Willow Island	14,457	12,140	5,527	5,091	3,859	4,328	3,787	760	1,129	1,574
Coal-fired Totals		**507,095**	**539,854**	**473,758**	**467,076**	**454,156**	**371,991**	**301,574**	**174,582**	**106,087**	**92,607**
55284	Big Sandy Peaker	0.2	0.0	0.0	0.4	0.6	0.6	0.3	0.1	0.1	0.1
55276	Ceredo	0.2	0.1	0.0	0.1	0.3	0.5	0.2	0.1	0.2	0.1
55349	Pleasants Energy	14.7	3.2	2.2	5.4	0.6	4.1	0.0	1.4	0.8	1.7
Natural Gas-Fired Totals		**15.0**	**3.3**	**2.2**	**5.9**	**1.4**	**5.3**	**0.5**	**1.7**	**1.1**	**1.9**
Percentage due to Natural Gas		**0.003%**	**0.001%**	**0.000%**	**0.001%**	**0.000%**	**0.001%**	**0.000%**	**0.001%**	**0.001%**	**0.002%**
WV EGU Totals		**507,110**	**539,858**	**473,760**	**467,082**	**454,158**	**371,996**	**301,574**	**174,583**	**106,088**	**92,609**

Table 15. WV EGU SO_2 Emissions, 2002 - 2011, as reported to CAMD

3.3. EGU Unit Specific Reductions

Table 16 indicates the current status of SO_2 controls and shutdowns of all coal-fired EGUs in West Virginia, and the projected controls or shutdowns that were included in the WV Regional Haze SIP.

Table 16: Summary of Regional Haze SIP Controls for West Virginia EGU's

Facility	ID	Unit	SO_2 Controls	Year SO_2 Controls Installed	Additional Controls Identified in Regional Haze SIP	Estimated SO_2 Reductions in 2009 from 2002 (tons)	Actual SO_2 Reductions in 2009 from 2002 (tons)	Comments
Albright	54-077-00001	1	---	---	2018 Shutdown	0	4,728	IPM predicted shutdown by 2018. Shutdown in September 2012.
		2	---	---	2018 Shutdown	0	4,052	IPM predicted shutdown by 2018. Shutdown in September 2012.
		3	---	---	2018 Scrubber/ SCR	3,222	6,892	IPM predicted Scrubber/SCR by 2018. Shutdown in September 2012.
Ft. Martin	54-061-00001	1	---	---	2010 Scrubber	22,141	22,962	Scrubber Installed 2010
		2	---	---	2010 Scrubber	22,953	20,501	Scrubber Installed 2010
Grant Town	54-049-00026	1A	CFB Limestone Injection	1992	---	328	-241	
		1B			---	328	-244	
Harrison	54-033-00015	1	Scrubber	1994	---	-2,683	-844	
		2	Scrubber	1994	---	-3,210	-510	
		3	Scrubber	1994	---	-3,276	-140	

Table 16: Summary of Regional Haze SIP Controls for West Virginia EGU's								
Facility	**ID**	**Unit**	**SO_2 Controls**	**Year SO_2 Controls Installed**	**Additional Controls Identified in Regional Haze SIP**	**Estimated SO_2 Reductions in 2009 from 2002 (tons)**	**Actual SO_2 Reductions in 2009 from 2002 (tons)**	**Comments**
John Amos	54-079-00006	1	---	---	2009 Scrubber	24,927	6,279	2011 Scrubber Installed, later than initially scheduled, but as required by Consent Decree
		2	---	---	2009 Scrubber	24,455	12,054	2010 Scrubber Installed, later than initially scheduled, but as required by Consent Decree
		3	---	---	2008 Scrubber	31,941	40,717	2009 Scrubber Installed, later than initially scheduled, but as required by Consent Decree
Kammer	54-051-00006	1	---	---	2018 Scrubber/ SCR	3,890	8,010	IPM predicted Scrubber/SCR by 2018. Company announced shutdown by June 2015
		2	---	---	2018 Scrubber/ SCR	2,580	8,192	IPM predicted Scrubber/SCR by 2018. Company announced shutdown by June 2015
		3	---	---	2018 Scrubber/ SCR	4,135	6,138	IPM predicted Scrubber/SCR by 2018. Company announced shutdown by June 2015

Table 16: Summary of Regional Haze SIP Controls for West Virginia EGU's								
Facility	**ID**	**Unit**	**SO_2 Controls**	**Year SO_2 Controls Installed**	**Additional Controls Identified in Regional Haze SIP**	**Estimated SO_2 Reductions in 2009 from 2002 (tons)**	**Actual SO_2 Reductions in 2009 from 2002 (tons)**	**Comments**
Kanawha River	54-039-00006	1	---	---	2018 Scrubber/ SCR	-1,261	2,335	IPM predicted Scrubber/SCR by 2018. Company announced shutdown by June 2015
		2	---	---	2018 Scrubber/ SCR	-1,640	2,672	IPM predicted Scrubber/SCR by 2018. Company announced shutdown by June 2015
Longview	54-061-00134	1	Dry Sorbent Injection	2011	---	0	0	Longview is a new 770 MW coal-fired plant that commenced operation in 2011. All IPM predicted emissions in 2018 from new EGU in WV were allocated to Longview in RH SIP
Mitchell	54-051-00005	1	Scrubber	2007	---	20,408	26,488	
		2	Scrubber	2007	---	20,134	26,348	
MEA	54-061-00027	CFB1	CFB Limestone Injection	1991	---	45	-95	
		CFB2			---	28	-102	
Mountaineer	54-053-00009	1	Scrubber	2007	---	32,828	40,456	
Mt. Storm	54-023-00003	1	Scrubber	2002	---	6,006	8,464	
		2	Scrubber	2001	---	8,038	10,036	
		3	Scrubber	1994	---	21	1,808	

Table 16: Summary of Regional Haze SIP Controls for West Virginia EGU's								
Facility	**ID**	**Unit**	**SO_2 Controls**	**Year SO_2 Controls Installed**	**Additional Controls Identified in Regional Haze SIP**	**Estimated SO_2 Reductions in 2009 from 2002 (tons)**	**Actual SO_2 Reductions in 2009 from 2002 (tons)**	**Comments**
North Branch	54-023-0014	1A	CFB Limestone Injection	1992	---	-745	203	Last Operated in 2009, permanent shutdown required by VA PSD Permit #81391
		1B			---	-880	205	
Philip Sporn	54-053-00001	11	---	---	2018 Scrubber/ SCR	-473	4,673	IPM predicted Scrubber/SCR by 2018. Company announced shutdown by June 2015
		21	---	---	2018 Scrubber/ SCR	164	3,250	IPM predicted Scrubber/SCR by 2018. Company announced shutdown by June 2015
		31	---	---	2018 Scrubber/ SCR	453	2,976	IPM predicted Scrubber/SCR by 2018. Company announced shutdown by June 2015
		41	---	---	2018 Scrubber/ SCR	604	4,979	IPM predicted Scrubber/SCR by 2018. Company announced shutdown by June 2015
		51	---	---	2018 Scrubber/ SCR	-6,796	7,427	IPM predicted Scrubber/SCR by 2018. Consent Decree requires shutdown by 2013.

Table 16: Summary of Regional Haze SIP Controls for West Virginia EGU's								
Facility	**ID**	**Unit**	**SO_2 Controls**	**Year SO_2 Controls Installed**	**Additional Controls Identified in Regional Haze SIP**	**Estimated SO_2 Reductions in 2009 from 2002 (tons)**	**Actual SO_2 Reductions in 2009 from 2002 (tons)**	**Comments**
Pleasants	54-073-00005	1	Scrubber	1979	Elimination of 15% flue gas bypass	20,235	16,138	Nov 2007 switched to new stack, eliminated 15% bypass
		2	Scrubber	1980	Elimination of 15% flue gas bypass	18,847	17,101	December 2007 switched to new stack, eliminated 15% bypass
Rivesville	54-049-00009	7	---	---	2018 Shutdown	0	690	IPM predicted shutdown by 2018. Shutdown in September 2012.
		8	---	---	2018 Shutdown	0	3,537	IPM predicted shutdown by 2018. Shutdown in September 2012.
Willow Island	54-073-00004	1	---	---	2018 Shutdown	0	3,923	IPM predicted shutdown by 2018. Shutdown in September 2012.
		2	---	---	2018 Scrubber/ SCR	-7,263	9,773	IPM predicted Scrubber/SCR by 2018. Shutdown in September 2012.
Totals						**240,486**	**331,832**	**Actual SO_2 emissions in 2009 were 91,347 tons less than predicted**

3.4. MANE-VU "Ask"

During the initial WV Regional Haze SIP development the MANE-VU states of New Jersey, New Hampshire and Vermont sent letters to West Virginia stating that based on 2002 emissions, West Virginia contributed to visibility impairment at Class I areas located in those states. The MANE-VU states identified 167 EGU stacks as contributing significantly to visibility impairment at MANE-VU Class I areas in 2002. MANE-VU asked states to control the SO_2 emissions from these units with a 90% efficiency ("EGU Ask"). MANE-VU also requested a control strategy to provide a 28% reduction in SO_2 emissions from sources, other than EGUs, that would be equivalent to their proposed low sulfur residential fuel oil strategy ("Non-EGU Ask").

3.4.a. MANE-VU "EGU Ask"

The MANE-VU states identified 167 EGU stacks, thirteen (13) of which were in West Virginia, as contributing significantly to visibility impairment at MANE-VU Class I areas in 2002. The 13 stacks in West Virginia that were identified by MANE-VU vent the emissions from twenty-three (23) EGUs in West Virginia. These 23 EGUs are identified in Table 17, along with the current status of controls, scheduled shutdowns, SO_2 control efficiency and 2002 and 2011 emissions. MANE-VU asked states to control the SO_2 emissions from these units with a 90% efficiency, as shown in the table all units identified are either shutdown (100% control), scheduled for shutdown (100% control), or have scrubbers with a minimum SO_2 control efficiency of 95%. As shown in the table, by 2011 there was a decrease of 396,258.6 tons (83%) in SO_2 emissions from 2002 levels, with an additional decrease of 85,019 tons (17.8%) from 2002 levels expected before 2018, due to scheduled shutdowns. WVDEP strongly believes that these reductions more than satisfy MANE-VU's "EGU Ask".

Table 17. 23 WV Electric Generating Units Identified in MANE-VU "EGU ASK"								
Plant	**ID**	**Unit**	**MW**	**2002 SO_2 Emissions (tons)**	**Current Status/ SO_2 Controls**	**Year of SO_2 Control Installation or Projected Shutdown**	**SO_2 Control Efficiency**	**2011 SO_2 Emissions (tons)[3]**
Albright	077-00001	3	137	10,136.5	Shutdown	2012	100%	5,034.5
Ft. Martin	061-00001	1	552	45,228.5	Scrubber	2010	95%	1,914.9
		2	555	45,890.7	Scrubber	2010	95%	2,038.2
John Amos	079-00006	1	800	31,938.0	Scrubber	2009	95%	5,174.7
		2	800	31,465.0	Scrubber	2009	95%	1,468.0
		3	1300	44,030.0	Scrubber	2008	95%	1,967.6
Kammer[1]	051-00006	1	210	14,896.0		Shutdown 2015	100%	5,846.8
		2	210	12,711.0		Shutdown 2015	100%	5,328.4
		3	210	14,452.0		Shutdown 2015	100%	5,537.1
Kanawha River	039-00006	1	200	7,944.0		Shutdown 2015	100%	5,652.5
		2	200	7,741.0		Shutdown 2015	100%	4,684.7
Mitchell	039-00006	1	800	29,568.0	Scrubber	2007	95%	2,152.9
		2	800	29,532.0	Scrubber	2007	95%	2,365.6
Mountaineer	053-00009	1	1300	42,992.0	Scrubber	2007	95%	2,009.5
Mt. Storm	023-00003	1	533	9,958.5	Scrubber	2002	95%	1,278.2
		2	533	10,467.4	Scrubber	2001	95%	1,020.2

Table 17. 23 WV Electric Generating Units Identified in MANE-VU "EGU ASK"								
Plant	**ID**	**Unit**	**MW**	**2002 SO_2 Emissions (tons)**	**Current Status/ SO_2 Controls**	**Year of SO_2 Control Installation or Projected Shutdown**	**SO_2 Control Efficiency**	**2011 SO_2 Emissions (tons)[3]**
		3	521	2,944.4	Scrubber	1994	95%	1,126.2
Philip Sporn[1, 2]	053-00001	1	150	6,638.0		Shutdown 2015	100%	3,920.9
		2	150	6,822.0		Shutdown 2015	100%	1,604.6
		3	150	6,939.0		Shutdown 2015	100%	3,975.7
		4	150	6,876.0		Shutdown 2015	100%	1,539.9
		5	450	13,863.0	Shutdown	Shutdown 2013	95%	0
Pleasants	073-00005	1	650	21,667.2	Scrubber	Eliminated 15% Bypass 2007	95%	7,037.8
		2	650	20,241.7	Scrubber	Eliminated 15% Bypass 2007	95%	5,995.4
		Total		**476,943.9**				**80,685.3**

[1] AEP Consent Decree [US District Court for the Southern District of Ohio, Eastern Division], Paragraph 87 requires that a total of at least 600 MW from the following list of Units: Sporn Units 1-4, Clinch River Units 1-3, Tanners Creek 1-3, and/or Kammer Units 1-3 be Retired, Retrofit, or Re-powered by December 31, 2018.
[2] AEP Consent Decree [US District Court for the Southern District of Ohio, Eastern Division], Paragraph 87 requires that Sporn Unit 5 be Retired, Retrofit, or Re-powered by December 31, 2013.
[3] 2011 Emissions data from EPA's Clean Air Markets website, Air Markets Program Data (AMPD): http://ampd.epa.gov/ampd/QueryToolie.html

3.4.b. MANE-VU "Non-EGU Ask"

The MANE-VU states identified 167 EGU stacks as contributing significantly to visibility impairment at MANE-VU Class I areas in 2002. MANE-VU has asked states to control the SO_2 emissions from these units with a 90% efficiency. MANE-VU also requested a control strategy to provide a 28% reduction in SO_2 emissions from sources, other than EGUs, that would be equivalent to their proposed low sulfur residential fuel oil strategy.

West Virginia's non-EGUs were predicted to emit 61,704 tons of SO_2 in 2018. MANE-VU in their "Non-EGU Ask" requested a 28% reduction in these emissions, or 17,277 tons of SO_2 reductions.

As discussed in Section C.2.7, and shown in Table 12, there have been a number of shutdowns of Non-EGU facilities and a number of shutdowns of large SO_2 emitting units at Non-EGU facilities.

- three (3) Non-EGU facilities have shutdown
  - Cabot (073-0006)
  - Columbian Chemical (051-0019)
  - FMC (039-0002)
- three (3) Non-EGUs have shutdown their coal-fired boilers and replaced them with natural gas-fired boilers
  - DOW (039-0003)
  - Braskem (099-0010)
  - Cytec (073-0003)
- one (1) Non-EGU has shutdown their coal-fired boiler
  - WV Alloys (019-0001)
- two (2) Non-EGUs have shutdown their Thermal Dryers
  - Herndon Processing (109-0002)
  - East Gulf Prep Plant (081-0012)

The shutdown of these units and facilities, have resulted in a reduction of 16,538 tons of SO_2 from 2002 emission levels.

Furthermore, as discussed above, all the EGUs identified in the MANE-VU "EGU Ask" will be either controlled with better than a 90% SO_2 control efficiency, or shutdown before 2018, and an additional 7 EGUs– Albright Units 2 and 3, Rivesville Units 7 and 8, Willow Island Units 1 and 2, and Northbranch Units 1A and 1B – have shutdown (see Table 16). These EGU shutdowns account for an additional 29,812 tons of SO_2 reductions from the EGU sector.

The 16,538 tons of SO_2 reductions resulting from shutdowns in the Non-EGU sector, and the 29,812 tons of SO_2 reductions resulting from additional shutdowns in the EGU sector, account for a total SO_2 reduction of 46,350 tons. These reductions have already taken place (well in advance of 2018), and amount to 268% of the 17,277 tons (28% reduction) that MANE-VU requested in their "Non-EGUU Ask". The WVDAQ is firmly convinced that these reductions more than satisfy the MANE-VU "Non-EGU Ask".

4. ASSESSMENT OF VISIBILITY CONDITIONS
[40 CFR 51.308(g)(3)]

40 CFR 51.308(g)(3) of the RHR requires:

> For each Class I area in the state, an assessment of the following visibility conditions and changes, with values for most impaired and least impaired days expressed in terms of 5 year averages of these annual values:
>
> (i) Current visibility conditions for the most and least impaired days;
> (ii) Difference between current visibility conditions for the most and least impaired days and baseline visibility conditions;
> (iii) Change in visibility impairment for the most impaired and least impaired days over the past five years.

The RHR at 40 CFR Section 51.308(d)(1) requires States to establish RPGs (in dv) for each Class I Federal area within the state and provide for reasonable progress towards achieving natural visibility. In the WV Regional Haze SIP, the WVDEP established a reasonable progress goal of a 7.3 dv reduction in visibility impairment by 2018, which is significantly greater than the 4.3 dv reduction required to meet the uniform rate of progress necessary to achieve a natural background condition of 10.4 by 2064. Likewise, West Virginia has also adopted a reasonable progress goal for the 20 percent best days that would result in a 1.2 dv reduction in visibility impairment (see Table 12).

Table 18. West Virginia Reasonable Progress Goals

Class I Area	Baseline Visibility, 20% Worst Days (Deciviews)	Reasonable Progress Goal (Deciview Improvement Expected by 2018, 20% Worst Days)	Baseline Visibility, 20% Best Days (Deciviews)	Reasonable Progress Goal (Deciview Improvement Expected by 2018, 20% Best Days)
Dolly Sods Wilderness Area	29.0	21.7 (7.3)	12.3	11.1 (1.2)
Otter Creek Wilderness Area	29.0	21.7 (7.3)	12.3	11.1 (1.2)

An analysis of emission reductions in West Virginia indicates that the state is on track to achieve these goals in 2018. Figures 14 and 15 address the three (3) requirements at 40 CFR 51.308 and depict the current visibility conditions; the difference between current and baseline visibility; and

a five-year rolling average for the most (20% worst) and least (20 percent best) days at Dolly Sods. As indicated by these figures, visibility at Dolly Sods has significantly improved since 2000.

Figure 8 below shows that recent observations demonstrate that visibility on the 20 percent worst days is below the glide path. Even when examining the changes in visibility impairment for the most impaired days, taken over a five-year rolling average, Dolly Sods is meeting its RPG. Moreover, expected future reductions in SO_2 emissions based on additional controls and shutdowns will serve to continue this downward trend in the coming years.

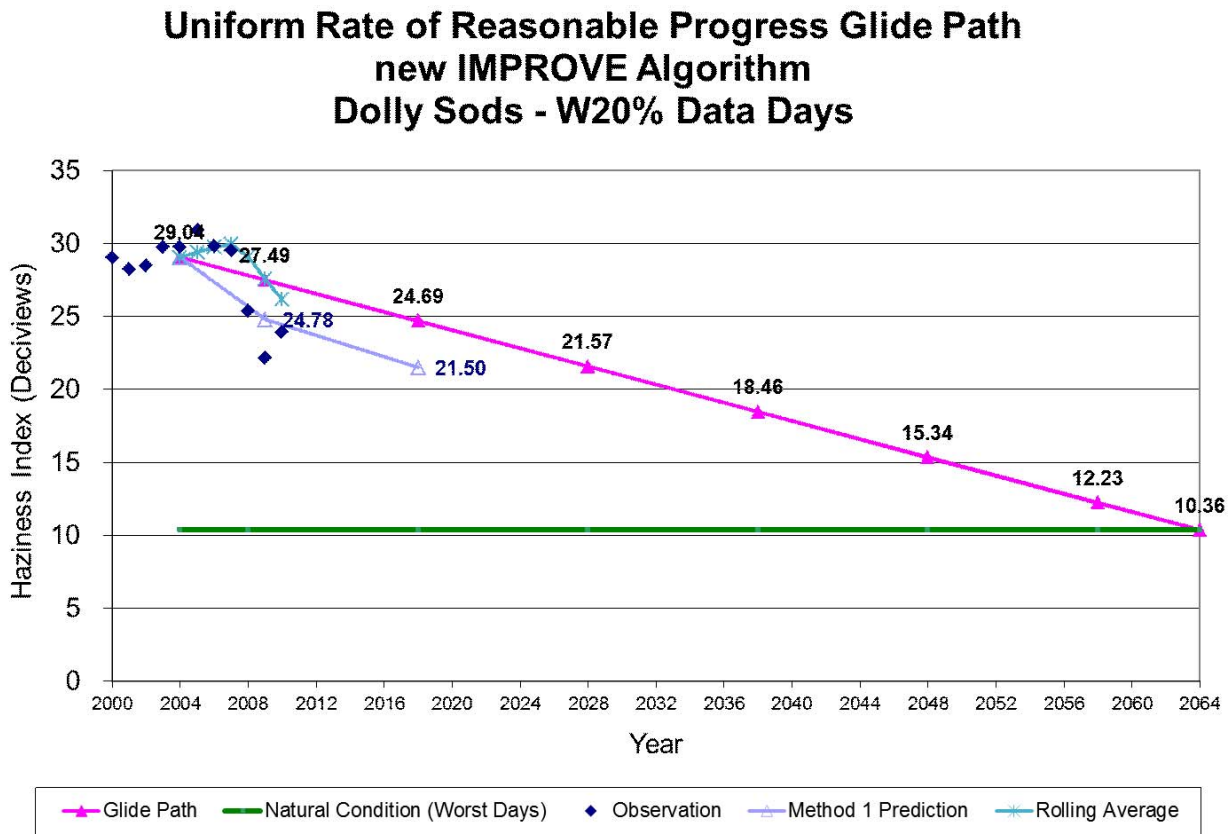


Figure 14. Uniform Rate of Reasonable Progress Glide Path for Dolly Sods on 20% Worst Days

In addition to improvement in visibility on the 20 percent worst visibility days, Figure 9 demonstrates that visibility on the 20 percent best days is also improving at Dolly Sods. The changes in visibility impairment for the least impaired days, taken over a five-year rolling average, are also improving more than originally anticipated in the WV Regional Haze SIP, and Dolly Sods is expected to meet or exceed its RPG in 2018.

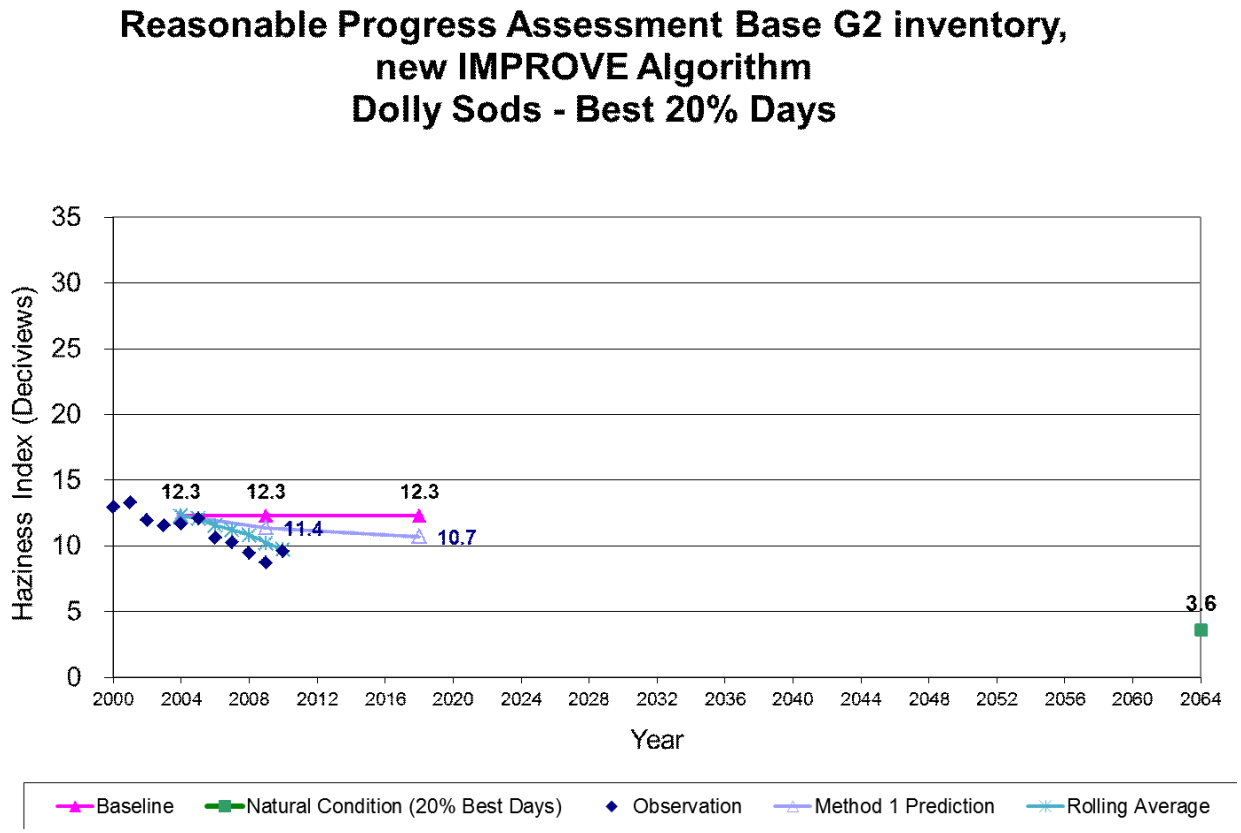


Figure 15. Reasonable Progress Assessment for Dolly Sods on 20% Best Days

As discussed in the WV Regional Haze SIP, the greatest benefits on the 20 percent worst visibility days for Dolly Sods were projected to result from reducing SO_2 from EGUs. As outlined in Section C.8, the reductions in SO_2 emissions from EGUs in West Virginia have been significant and are expected to continue over the next five years.

The DEP committed in its WV Regional Haze SIP to re-examine the need for additional non-EGU controls during this, the state's five-year progress report. As evidenced by the current and future SO_2 emission reductions from EGUs, further reductions from non-utility, industrial point sources continues to be unnecessary at this time.

5. ANALYSIS OF EMISSIONS CHANGES BY SOURCE CATEGORY
[40 CFR 51.308(g)(4)]

40 CFR 51.308(g)(4) requires:

> An analysis tracking the change over the past 5 years in emissions of pollutants contributing to visibility impairment from all sources and activities within the State. Emissions changes should be identified by type of source or activity. The analysis must be based on the most recent updated emissions inventory, with estimates projected forward as necessary and appropriate, to account for emissions changes during the past 5-year period."

Moreover, the RHR (64 FR 35747) goes on to require that *"Each 5 year progress report must contain . . . An emissions tracking report that analyzes the changes over the past 5 years in emissions of pollutants contributing to visibility impairment, disaggregated by source category and emissions activity, for significant categories of sources or activities."*

40 CFR 51.308(d)(4)(v) of the RHR requires a statewide inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment. As such, the VISTAS states developed an inventory for the base year of 2002, along with estimated inventories for future years of 2009 and 2018. The pollutants inventoried include volatile organic compounds (VOC), NO_x, $PM_{2.5}$, PM_{10}, ammonia (NH_3), and SO_2. Five emission inventory source classifications were developed and include: Stationary point and area sources, off-road and on-road mobile sources, and biogenic sources. Throughout the course of its work to develop the Regional Haze SIPS, VISTAS made several improvements to the emissions inventory to improve model performance. Appendix D of the WV Regional Haze SIP describes in depth the state's efforts with regard to the initial emission inventory development and subsequent emission tracking.

The West Virginia Regional Haze SIP was developed using the Base G2 Emission Inventory. A final iteration of the emissions inventory known as Base G4, or "Best and Final", was made available in 2008. Tables 21 and 22 show the projected 2009 Base G4, and 2018 Base G4 inventory, respectively.

The Southeastern Modeling, Analysis, and Planning (SEMAP) project is funded by the EPA and the same ten states originally involved in the VISTAS project. The organizational change was primarily an administrative convenience (e.g., to address grant funding constraints). The SEMAP project addresses the next phase of ozone, fine particle and regional haze assessment obligations of the member states. The SEMAP project was designed to produce technical analyses to aid the participating agencies in developing SIPs required by the Clean Air Act, including the development of a 2007 inventory for the Southeastern states. Table 23 shows a summary of the 2007 SEMAP inventory. The 2007 SEMAP inventory is the most recent, fully vetted inventory available.

Although emissions inventories for 2002, 2007, 2009 and 2018 are presented, it is difficult to make comparisons between the inventories. The 2002 inventories represent actual and typical historical emissions, while the 2009 and 2018 inventories are projection inventories, based on predictions of

future events. All inventories are estimates of emissions based on the best assumptions available at the time of development. Estimates for the 2002, 2009 and 2018 inventories were developed starting in 2004 and finalized in 2007 using different assumptions than those used for the 2007 estimates. Estimates of current emissions require the use of emission factors based on surrogate data, since direct measurements are not often available. Projections of future emissions also involve assumptions - for example, assumptions about economic growth, population growth, growth in fuel consumption, the balance among different fuels, such as coal, oil and natural gas. There have been significant changes – in the economy, the balance among fuels, the growth in fuel consumption, the regulatory requirements affecting different industries – that were not foreseen when the 2009 and 2018 projections were made. Natural gas prices have declined, coal prices have risen, coal-fired power plants have been shut down. EPA has also updated emission factors. Further adding to the confusion are changes in emissions models used to estimate emissions, for example Mobile 6.2 and MOVES, while both used to estimate onroad mobile source emissions, give significantly different results for similar inputs.

The 2002, 2009 and 2018 inventories were developed by VISTAS and finalized in 2007. Future year projections were prepared based on the base year 2002 inventory for 2009 and 2018. The projections reflected a scenario accounting for all in-place controls that were fully adopted into federal or individual state regulations or SIPs. Controls to comply with the Clean Air Interstate Rule (CAIR) were included in what was referred to as the "On the Books/On the Way" scenario. Several versions of the inventories were developed, with improvements made in each subsequent version. The final VISTAS inventory was Base G4. The 2007 inventory was prepared by SEMAP and finalized in 2012.

Documentation for the 2002, 2009, and 2018 VISTAS inventories is contained in Appendix D of the WV Regional Haze SIP, submitted to EPA June 18, 2008. Documentation for the 2007 SEMAP inventory is contained in Appendix A to this Progress Report.

Table 19. West Virginia 2002 Actual Emissions Inventory by Source Sector

State	Sector	NH_3	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
WV	Point	453	277,589	22,076	15,523	570,154	15,775
	Onroad	1,908	58,999	1,381	995	2,464	42,174
	Nonroad	6	33,239	1,850	1,728	2,112	18,566
	Area	9,963	12,687	115,346	21,049	11,667	60,443
	Fires	30	1,032	3,673	3,580	40	2,376
	Total	**12,360**	**383,546**	**144,326**	**42,875**	**586,437**	**139,334**

Table 20. West Virginia 2002 Typical Emissions Inventory by Source Sector							
State	**Sector**	**NH_3**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**VOC**
WV	Point	453	269,055	21,975	15,476	554,458	15,736
	Onroad	1,908	58,999	1,381	995	2,464	42,174
	Nonroad	6	33,239	1,850	1,728	2,112	18,566
	Area	9,963	12,687	115,346	21,049	11,667	60,443
	Fires	30	1,032	3,673	3,580	40	2,376
	Total	**12,360**	**375,012**	**144,225**	**42,828**	**570,741**	**139,295**

Table 21. West Virginia 2009 Base G4 Emissions Inventory by Source Sector							
State	**Sector**	**NH_3**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**VOC**
WV	Point	644	123,499	17,539	10,578	324,550	14,404
	Onroad	2,148	35,635	1,068	684	279	24,843
	Nonroad	11	30,133	1,640	1,528	359	18,069
	Area	10,625	13,439	115,089	20,664	12,284	55,288
	Fires	12	944	3,276	3,239	16	2,184
	Total	**13,440**	**203,650**	**138,612**	**36,693**	**337,488**	**114,788**

Table 22. West Virginia 2018 Base G4 Emissions Inventory by Source Sector							
State	**Sector**	**NH_3**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**VOC**
WV	Point	521	94,754	19,986	12,240	167,901	16,968
	Onroad	2,497	17,247	819	405	253	16,121
	Nonroad	13	25,710	1,292	1,198	56	14,086
	Area	11,504	14,828	121,549	21,490	12,849	60,747
	Fires	12	944	3,276	3,239	16	2,184
	Total	**14,547**	**153,483**	**146,922**	**38,572**	**181,075**	**110,106**

Table 23. West Virginia 2007 Emissions Inventory by Source Sector							
State	**Sector**	**NH_3**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**VOC**
WV	Point	366	188,629	34,457	30,522	428,350	12,503
	Onroad	875	59,968	2,397	1,926	487	25,205
	Nonroad	22	36,513	2,034	1,909	1,656	18,609
	Area	12,858	3,574	100,427	16,862	6,504	32,089
	Fires	13	61	240	207	17	118
	Total	**14,134**	**288,745**	**139,555**	**51,426**	**437,014**	**88,524**

As noted earlier, VISTAS identified sulfate as the major contributor to regional haze, and focused efforts on the control of SO_2 from point sources, primarily EGUs and industrial boilers. As can be seen in the chart below, SO_2 emissions in 2007 were in line with the projected reductions. Further, as shown earlier in Table 14, and Figure 7, EGU emissions have decreased significantly. In 2009 actual EGU emissions were below what was predicted for 2009, and 2010 and 2011 EGU emissions were below what was predicted for 2018.

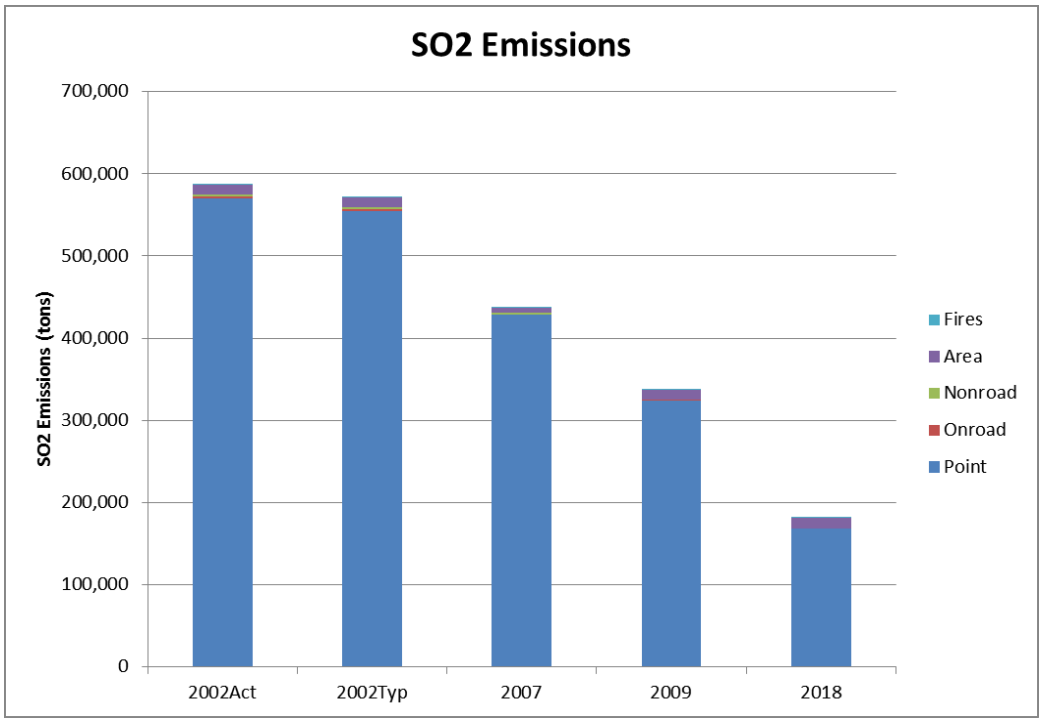


Figure 16. SO_2 Emissions by Sector for 2002 Actual, 2002 Typical, 2007, 2009 and 2018

6. ASSESSMENT OF SIGNIFICANT CHANGES IN ANTHROPOGENIC EMISSIONS [40 CFR 51.308(g)(5)]

40 CFR 51.308(g)(5) of the RHR requires:

> An assessment of any significant changes in anthropogenic emissions within or outside the state that have occurred over the past 5 years that have limited or impeded progress in reducing pollutant emissions and improving visibility.

Figure 17 indicates that sulfates continue to be the largest single contributor to regional haze at Dolly Sods. As explained in the WV Regional Haze SIP and earlier, the WVDEP focused its analysis for the WV Regional Haze SIP on addressing large SO_2 emissions from point sources.

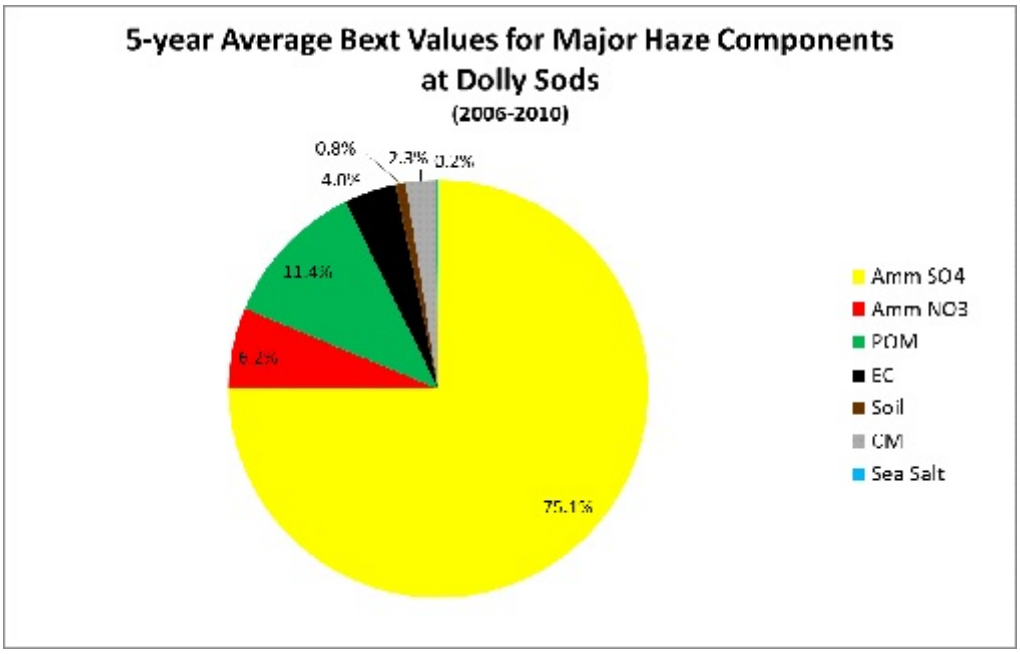


Figure 17. 5-year Average Light Extinction Values for Major Haze Components at Dolly Sods (2006-2010)

After Ammonium Sulfate (75.1%), the next largest fraction of regional haze at Dolly Sods is primary organic matter (POM) (11.4%). While sulfates continue to be the largest contributor to visibility impairment, as indicated in Figure 10, the contributions of POM (11.4%), ammonium nitrate (Amm NO_3 - 6.2%) and elemental carbon (EC - 4.0%) are also of concern. This is also shown in Figures 18 and 19.

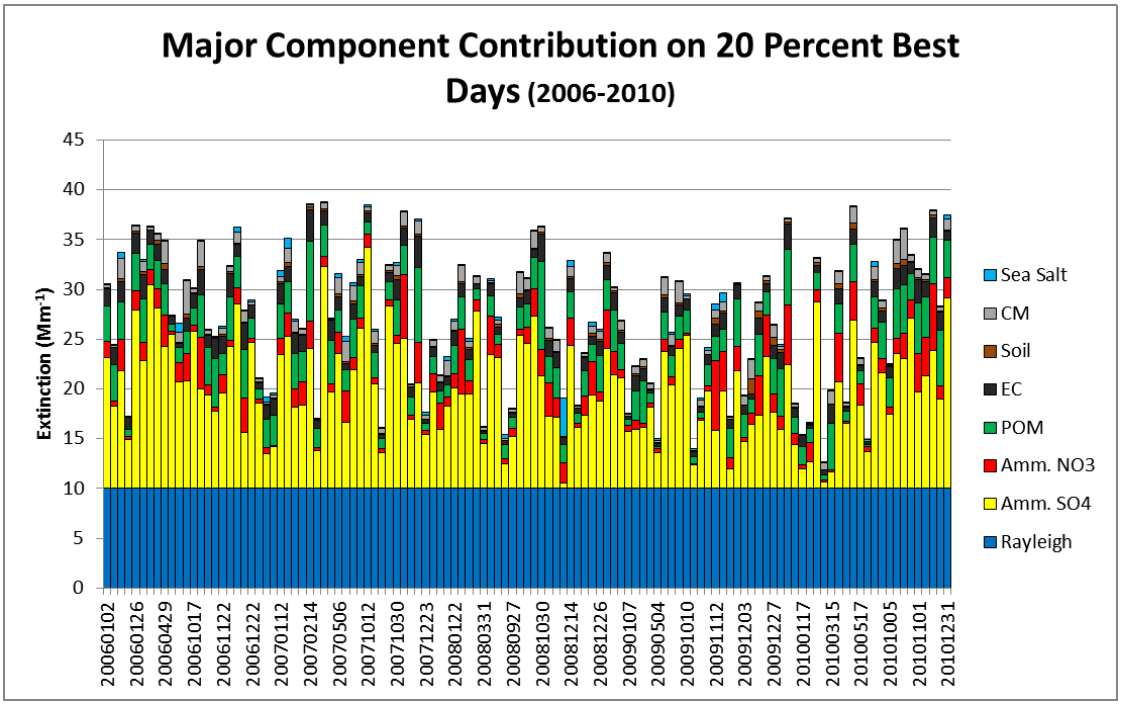


Figure 18. Major Component Contribution on 20 Percent Best Days (2006-2010)

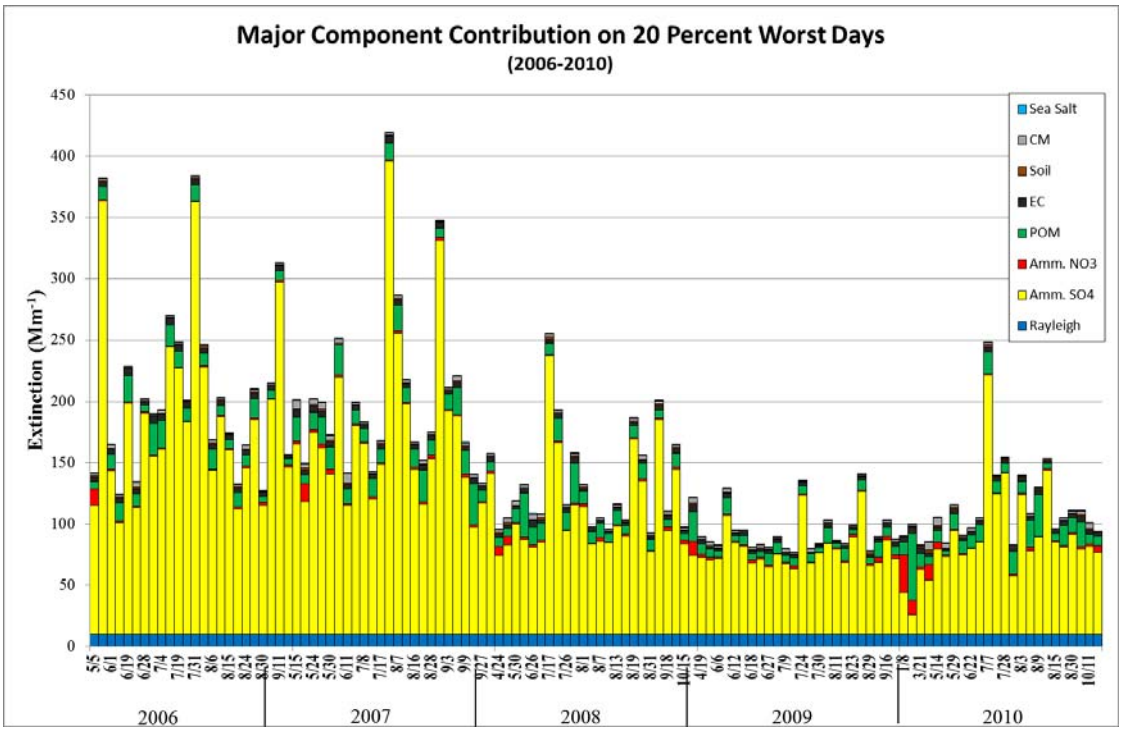


Figure 19. Major Component Contribution on 20 Percent Worst Days (2006-2010)

Analysis of the annual averages by species for 2000 through 2010, for the 20 percent best and 20 percent worst days at Dolly Sods, show a significant improvement in visibility and a significant decrease in the sulfate contribution to visibility impairment, as can be seen in Figure 20.

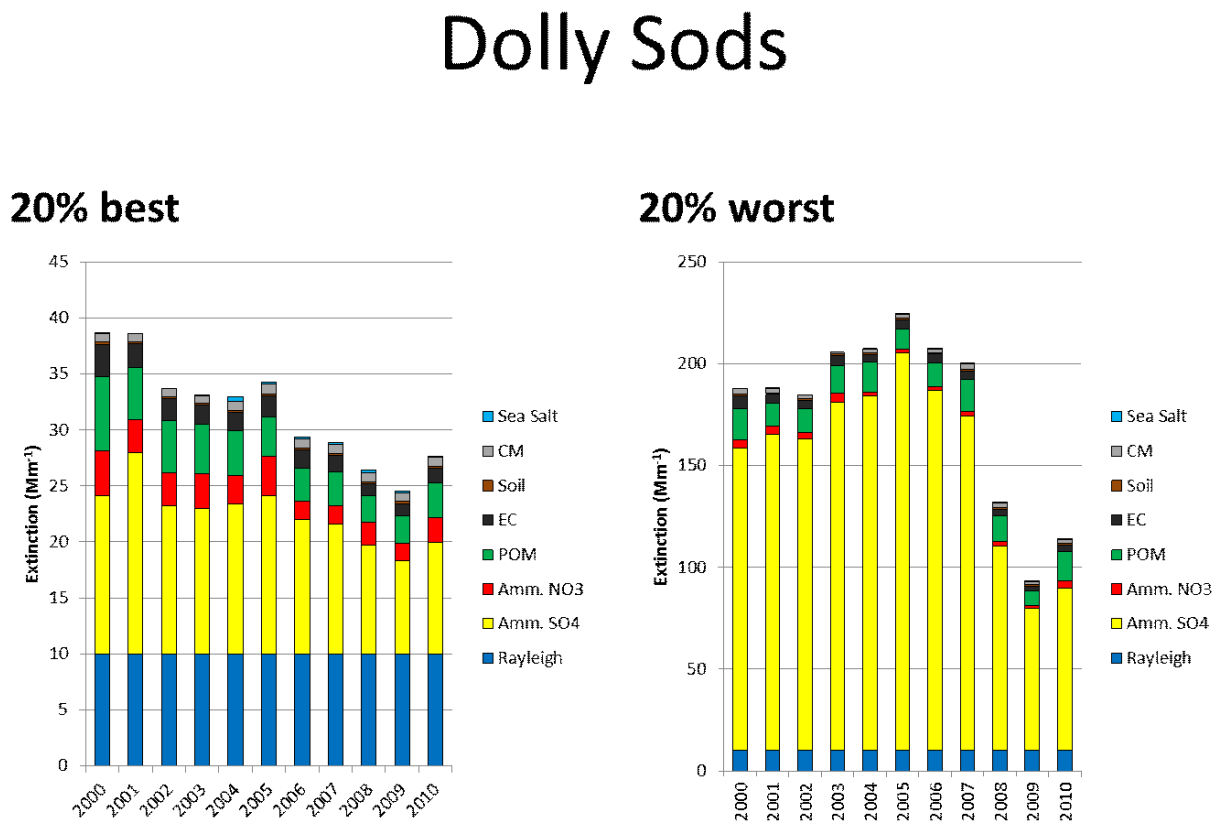


Figure 20. Annual Average Species Contribution on 20% Best and Worst Days at Dolly Sods (2000-2010)

7. ASSESSMENT OF ELEMENTS AND STRATEGIES FOR MEETING RPG [40 CFR 51.308(g)(6)]

40 CFR 51.308(g)(6) of the RHR rule requires:

> An assessment of whether the current implementation plan elements and strategies are sufficient to enable the state, or other states with Class I area affected by emissions from the State, to meet all established reasonable progress goals.

Based upon the relevant data; projected emissions; and modeling results, WVDEP is convinced that the current implementation plan elements and strategies outlined in the original West Virginia Regional Haze SIP are sufficient to enable the state and other neighboring states to meet all established RPGs.

7.1. Dolly Sods and Otter Creek, WV

7.1.a. Description

In the mid-1800s, the Dalhe family used open grassy fields called "sods" for grazing sheep in this area, which now bears the name Dolly Sods Wilderness. The region, located high on the Allegheny Plateau, is known for its extensive rocky plains, upland bogs, and sweeping vistas. In the lower elevations, you'll find a forest of northern hardwoods and laurel thickets. Higher up, groves of wind-stunted red spruce stand near heath barrens where azaleas, mountain laurels, rhododendron, and blueberries grow. The bogs are unique depressions of sphagnum moss, cranberries, and the insect-eating sundew plant--an ecosystem you'd expect to see in northern Canada. Beaver ponds dot the Wilderness and the headwaters of Red Creek spill out of the area.

Figure 21. Dolly Sods

In a natural bowl between Shavers Mountain (on the east side) and McGowan Mountain (on the west side) lies Otter Creek Wilderness. Most of the numerous streams in the area flow into Otter Creek, which runs north across the Wilderness into the Dry Fork River. From the mouth of Otter Creek, the terrain rises to about 3,900 feet on McGowan Mountain. The area, logged extensively between 1897 and 1914, now sports a second-growth forest, dense thickets of rhododendron and mountain laurel along the streams, and a variety of mosses in damper regions. Spruce dominate the higher country and give way to hardwoods such as black cherry and yellow birch lower down. Black bears have returned and are reunited with white-tailed deer, wild turkeys, hares, rabbits, grouse, and several species of squirrels. Beavers are active in several spots. Timber rattlesnakes may be seen, and Otter Creek shelters a small population of brook trout.

Figure 22. Otter Creek Wilderness

7.1.b. Assessment

As stated in Section C.4, an analysis of emission reductions in West Virginia indicates that the state is on track to achieve the reasonable progress goals in 2018. Figures 14 and 15 address the three (3) requirements at 40 CFR 51.308 and depict the current visibility conditions; the difference between current and baseline visibility; and a five-year rolling average for the most (20% worst) and least (20% best) impaired days at Dolly Sods. As indicated by these figures, visibility at Dolly Sods has significantly improved since 2000.

Figure 14 shows that recent observations demonstrate that visibility on the 20 percent worst days is below the glide path. Even when examining the changes in visibility impairment for the most impaired days, taken over a five-year rolling average, Dolly Sods is meeting its RPG. Moreover, expected future reductions in SO_2 emissions based on additional controls and shutdowns will serve to continue this downward trend in the coming years.

7.2. Brigantine Wilderness, NJ

7.2.a. Description

Brigantine Wilderness is located in southern New Jersey on the Atlantic Coast, about 11 miles north of Atlantic City. The 6,600 acre wilderness area, located within the Edwin B. Forsythe National Wildlife Refuge (NWR), comprises four areas: the Holgate Peninsula, Little Beach Island and the marshes west of the island, and two areas near the mouth of the Mullica River. Habitat includes primarily salt marsh, beach, and dune, with a small area of hardwood upland on Little Beach Island.

The Edwin B. Forsythe NWR is on the Ramsar List of Wetlands of International Importance and is part of the Marine Estuarine Reserve Research System. Species that use the refuge include the Atlantic brant, American black duck, peregrine falcon, osprey and bald eagle. Upland species include songbirds, woodcock, white-tailed deer and the box turtle. Threatened species include the piping plover.

Figure 23. Brigantine Wilderness

7.2.b. Assessment

During the initial regional haze SIP development, as explained in Section B, VISTAS identified the SO_2 Areas of Influence for Class I areas in the VISTAS region and neighboring regions, including the Brigantine Wilderness. The AoI for Brigantine is shown in Figure 24.

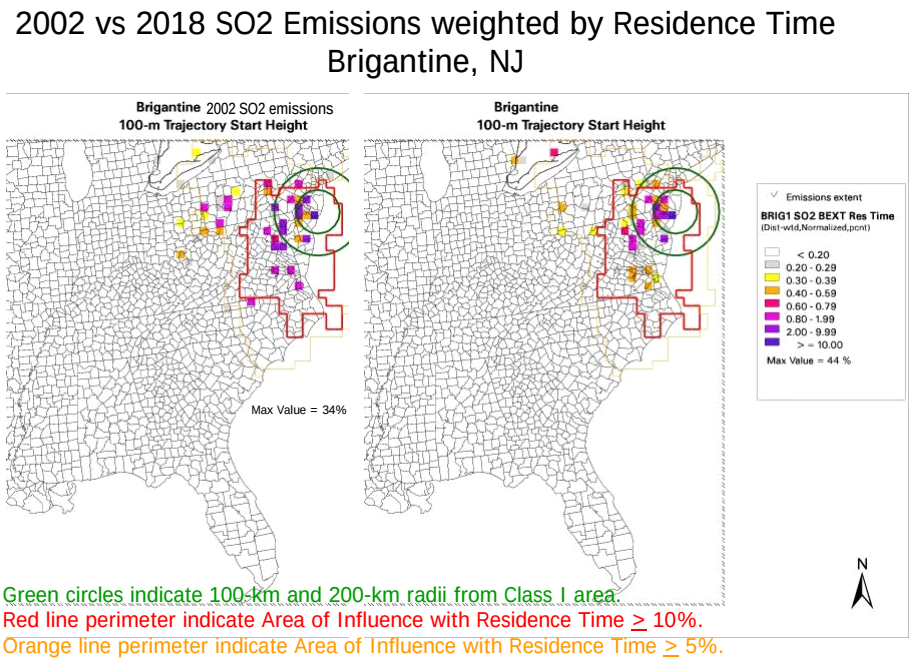


Figure 24. Brigantine, NJ 2002 (left) and 2018 (right) SO_2 distance weighted emissions * SO_4 extinction weighted residence time plots

Table 24. 2018 SO_2 Point Source Contribution to Brigantine, NJ by State			
State	**Relative Contribution**	**State**	**Relative Contribution**
Connecticut	0.05%	North Carolina	0.75%
Washington, DC	0.05%	Ohio	0.52%
Delaware	27.83%	Pennsylvania	13.63%
Maryland	7.67%	Virginia	7.90%
New Jersey	40.11%	West Virginia	0.94%
New York	0.56%		

There were 278 units identified within the Area of Influence which were projected to contribute to the sulfate at Brigantine, including 15 units in West Virginia. Twenty-five (25) units were projected to have a relative contribution greater than 0.5% and contribute 70.75% to sulfate, none of which are located in West Virginia. Ten (10) units were projected to have a relative contribution greater than 1.0% and contribute 59.92% to sulfate, none of which are located in West Virginia. Capitol

Cement, Kiln 7 (Emission Point 010), with a projected relative contribution of 0.10%, had the largest relative contribution to sulfate at Brigantine of any West Virginia source. Kiln 7 has since permanently shutdown, as discussed in Sections C.1.5 and C.2.7. As shown in Figures 25 and 26 Brigantine is on track to achieve RPG in 2018.

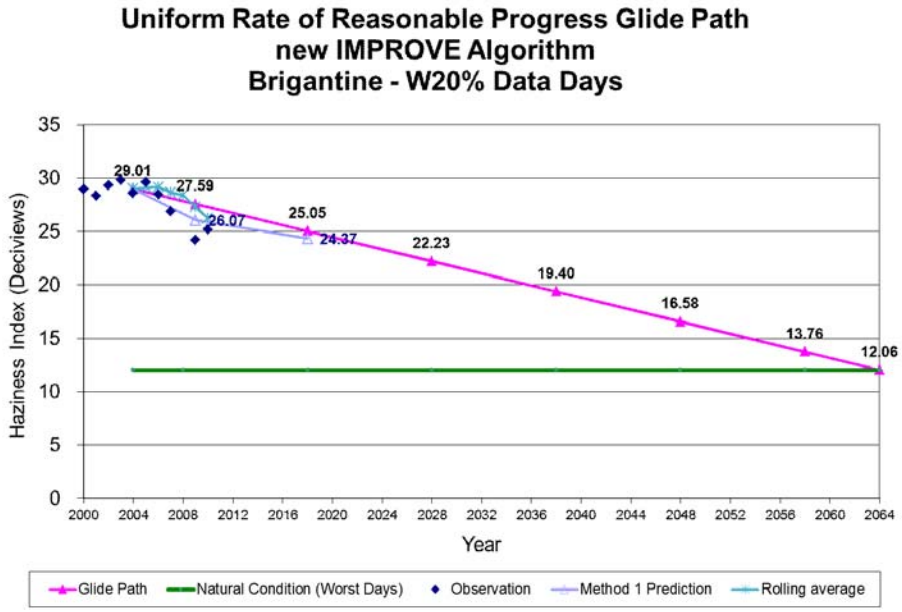


Figure 25. Glide Path for Brigantine, NJ on 20% Worst Days

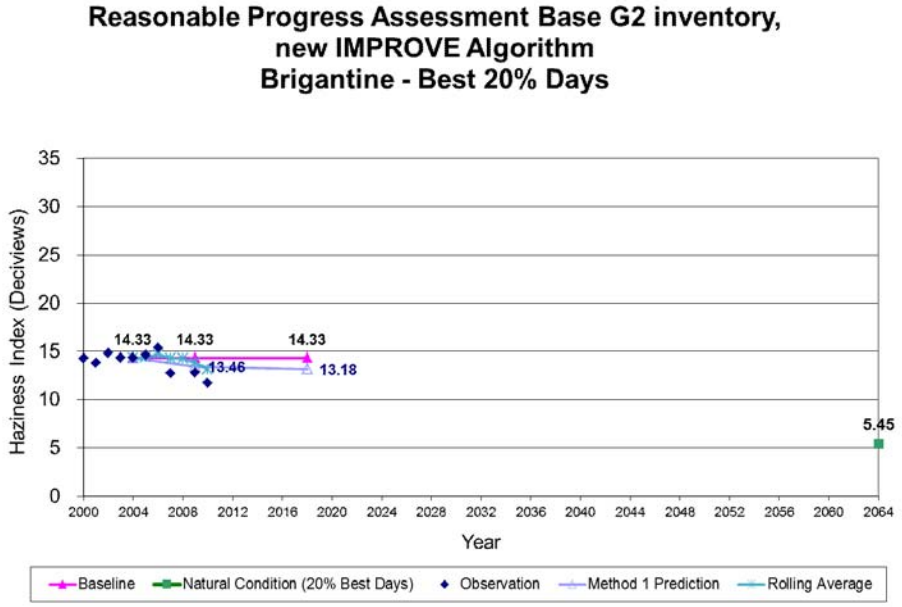


Figure 26. Glide Path for Brigantine, NJ on 20% Best Days

7.3. Great Smoky Mountains National Park, NC and TN

7.3.a. Description

Established in 1934, Great Smoky Mountains National Park is comprised of ridge upon ridge of endless forest straddling the border between North Carolina and Tennessee. World renowned for the diversity of its plant and animal life, the beauty of its ancient mountains, and the quality of its remnants of Southern Appalachian mountain culture, this is America's most visited national park.

Figure 27. Great Smoky Mountains

7.3.b. Assessment

During the initial regional haze SIP development, as explained in Section B, VISTAS identified the SO_2 Areas of Influence for Class I areas in the VISTAS region and neighboring regions, including the Great Smoky Mountains. The AoI for the Great Smoky Mountains is shown in Figure 28.

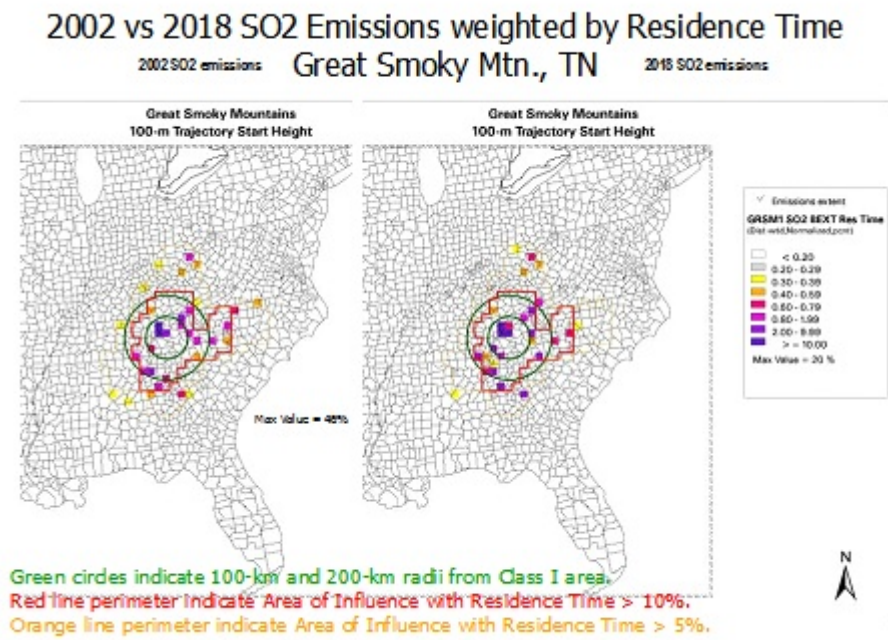


Figure 28. Great Smoky Mountains, NC and TN 2002 (left) and 2018 (right) SO_2 distance weighted emissions * SO_4 extinction weighted residence time plots

Table 25. 2018 SO_2 Point Source Contribution to Great Smoky Mountains, NC and TN by State			
State	**Relative Contribution**	**State**	**Relative Contribution**
Alabama	3.12%	South Carolina	2.44%
Georgia	7.74%	Tennessee	74.50%
Kentucky	1.02%	Virginia	2.34%
North Carolina	7.43%	West Virginia	0.54%
Ohio	0.87%		

There were 193 units identified within the Area of Influence which were projected to contribute to the sulfate at Great Smoky Mountains, including five (5) units in West Virginia. Thirty-eight (38) units were projected to have a relative contribution greater than 0.5% and contribute 79.85% to sulfate, including zero (0) units in West Virginia. Ten (10) units were projected to have a relative contribution greater than 1.0% and contribute 61.00% to sulfate, including zero (0) units in West

Virginia. As shown in Figures 29 and 30 the Great Smokey Mountains are on track to achieve RPG by 2018.

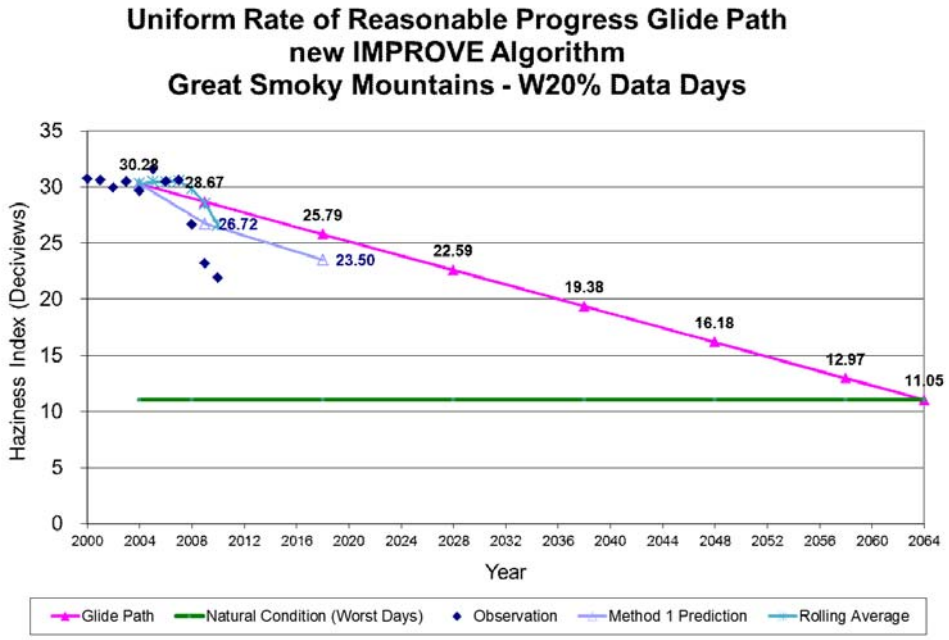


Figure 29. Glide Path for Great Smoky Mountains, NC and TN on 20% Worst Days

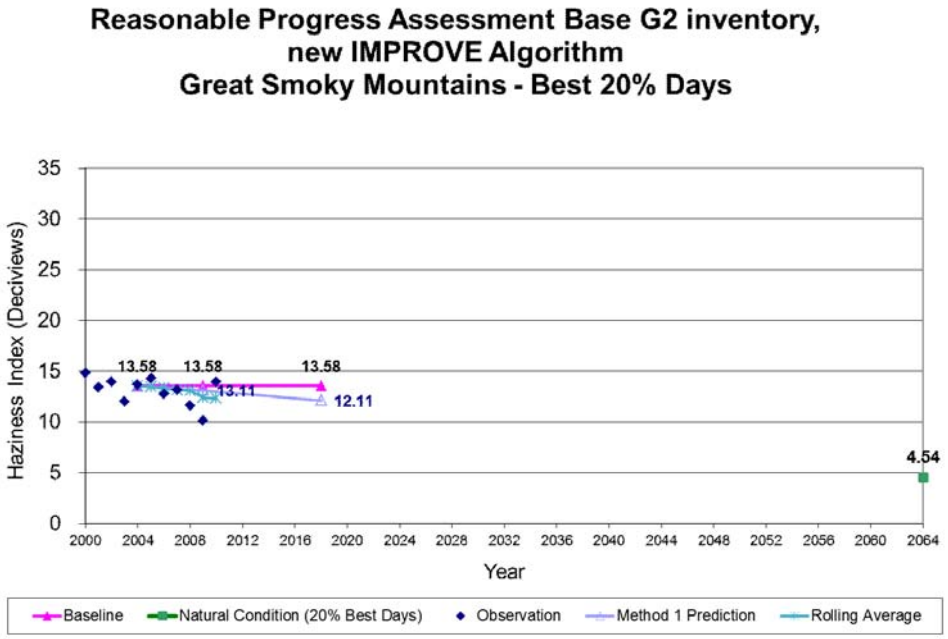


Figure 30. Glide Path for the Great Smoky Mountains, NC and TN on 20% Best Days

7.4. James River Face, VA

7.4.a. Description

James River Face Wilderness is located in Bedford and Rockbridge Counties in west central Virginia. The first designated wilderness in Virginia (1975), James River Face is bounded on the northeast by the James River and on the south by Petites Gap Road. James River Face reaches a high point of 3,073 feet on Highcock Knob near the southern boundary, and a low point of about 650 feet near the river. Vegetation is dominated by a typical Appalachian hardwood forest. The Devil's Marbleyard, a unique quartzite boulder field, lies within this wilderness.

Figure 31. James River Face Wilderness

7.4.b. Assessment

During the initial regional haze SIP development, as explained in Section B, VISTAS identified the SO_2 Areas of Influence for Class I areas in the VISTAS region and neighboring regions, including the James River Face Wilderness Area. The AoI for James River Face is shown in Figure 32.

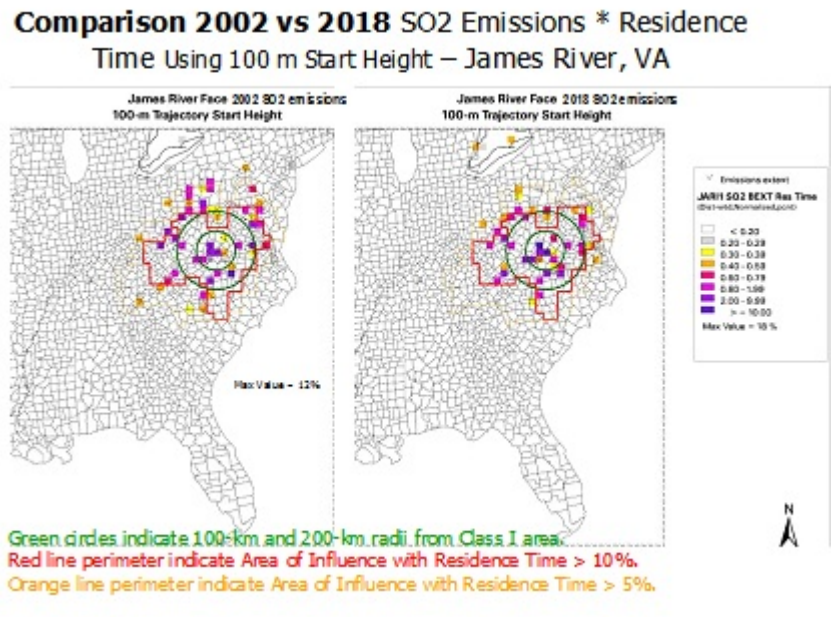


Figure 32. James River Face, VA 2002 (left) and 2018 (right) SO_2 distance weighted emissions * SO_4 extinction weighted residence time plots

Table 26. 2018 SO_2 Point Source Contribution to James River Face, VA by State			
State	**Relative Contribution**	**State**	**Relative Contribution**
Washington, DC	0.02%	Pennsylvania	1.59%
Delaware	0.59%	South Carolina	0.89%
Kentucky	2.02%	Tennessee	1.69%
Maryland	3.12%	Virginia	62.08%
North Carolina	9.31%	West Virginia	15.10%
Ohio	3.60%		

There were 336 units identified within the Area of Influence which were projected to contribute to the sulfate at James River Face, including 66 units in West Virginia. Thirty-nine (39) units have a relative contribution greater than 0.5% and contribute 49.92% to sulfate, including ten (10) units in West Virginia, nine (9) of which are EGUs. Twelve (12) units have relative contribution greater than 1.0% and contribute 67.91% to sulfate, including three (3) units in West Virginia, all of which are EGUs. West Virginia was projected to have a 15.10% relative contribution to sulfate at James River Face. Nine (9) EGUs in West Virginia and WV Alloys were projected to have a relative contribution

greater than 0.5%. EGU reductions are discussed in Section C.3, and the shutdown of the coal-fired boilers at WV Alloys is discussed in Section C.2.7. As shown in Figures 33 and 34 James River Face is on track to achieve RPG by 2018.

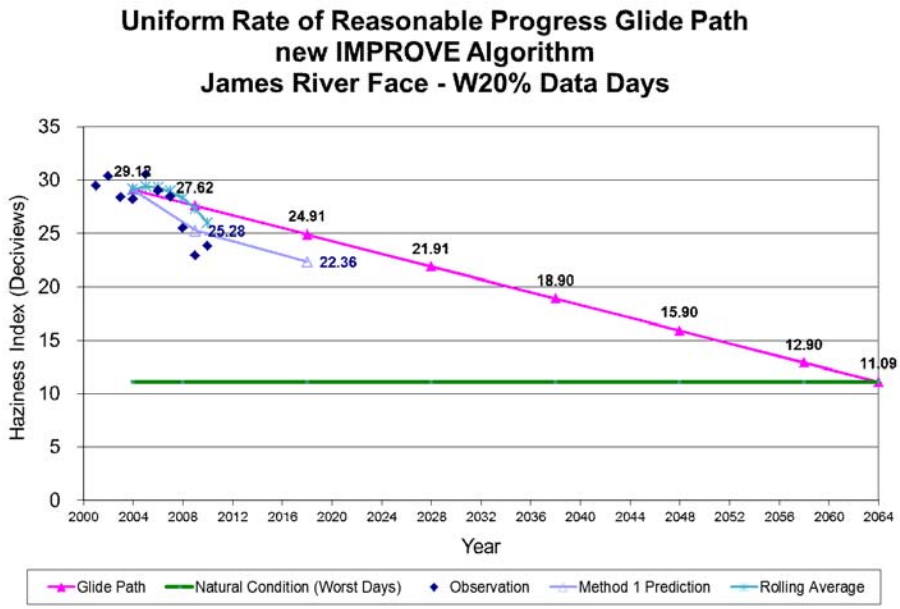


Figure 33. Glide Path for James River Face, VA on 20% Worst Days

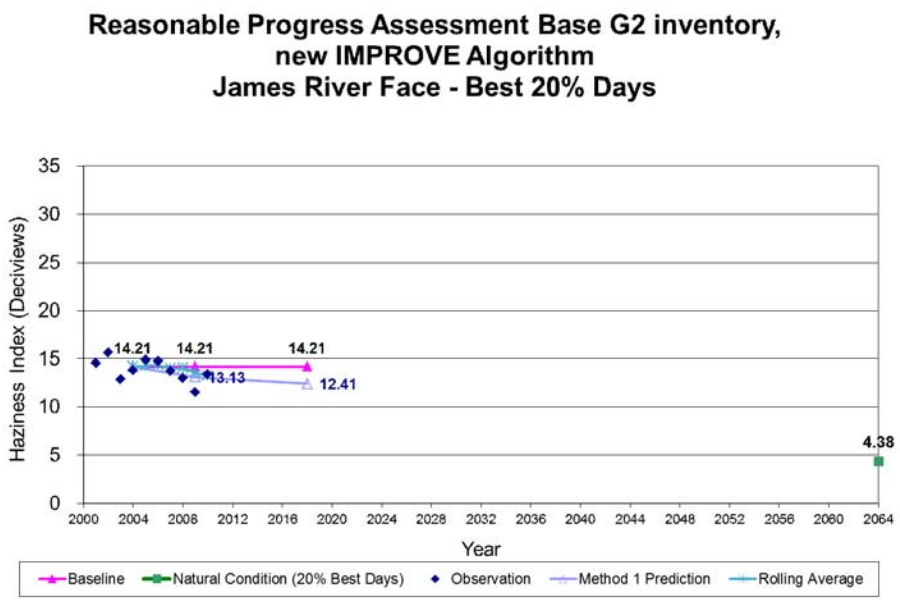


Figure 34. Glide Path for the James River Face, VA on 20% Best Days

7.5. Linville Gorge, NC

7.5.a. Description

Native Americans scalped explorers William Linville and his son in 1766, an unhappy ending for a family whose name is now associated with one of the most scenic river gorges in the eastern United States. From its headwaters high on Grandfather Mountain, the powerful Linville River patiently carves the rugged, steep-walled gorge that encloses it for approximately 12 miles. Within the gorge, the river drops a dramatic 2,000 feet before leveling out in the Catawba Valley. East of the gorge is Jonas Ridge; west is Linville Mountain. The gorge's rim extends 3,400 feet, compared to the river's average of 2,000 feet. Plant communities range from lichens and shrubs on the cliffs to laurel and rhododendron along the riverbanks. In some spots, the gorge shelters stands of virgin timber.

Figure 35. Linville Gorge

7.5.b. Assessment

As part of the initial regional haze SIP development, as explained in Section B, VISTAS identified the SO_2 Areas of Influence for Class I areas in the VISTAS region and neighboring regions, including Linville Gorge. The AoI for Linville Gorge is shown in Figure 36.

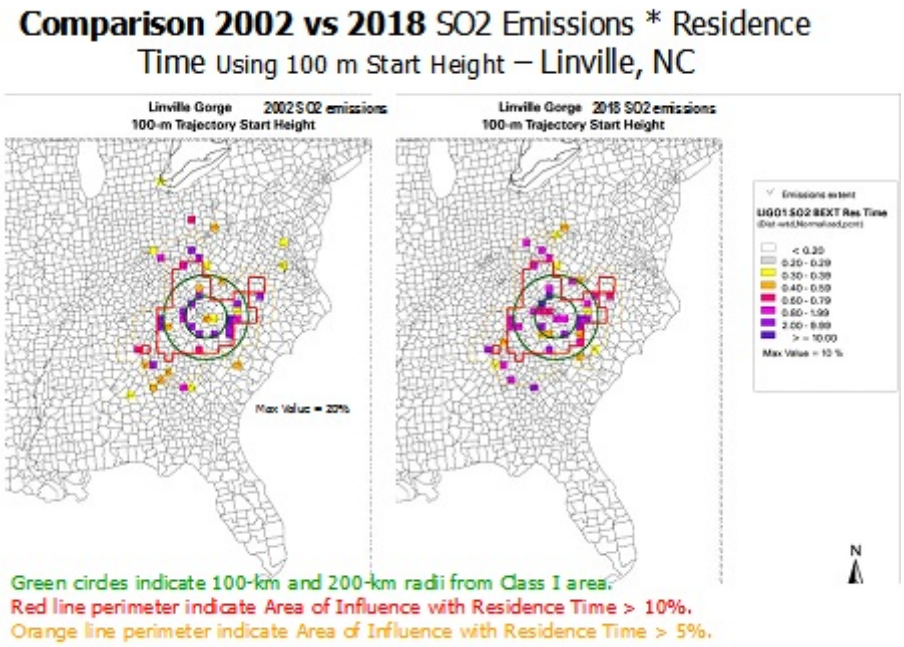


Figure 36. Linville Gorge, NC 2002 (left) and 2018 (right) SO_2 distance weighted emissions * SO_4 extinction weighted residence time plots

Table 27. 2018 SO_2 Point Source Contribution to Linville Gorge, NC by State			
State	**Relative Contribution**	**State**	**Relative Contribution**
Alabama	1.35%	South Carolina	3.93%
Georgia	1.98%	Tennessee	36.29%
Kentucky	0.90%	Virginia	16.53%
North Carolina	34.76%	West Virginia	2.49%
Ohio	1.77%		

There were 207 units identified within the Area of Influence which were projected to contribute to the sulfate at Linville Gorge, including seventeen (17) units in West Virginia. Thirty-five (35) units have a relative contribution greater than 0.5% and contribute 74.69% to sulfate, including one (1) unit in West Virginia, which is an EGU. Eighteen (18) units have relative contribution greater than 1.0% and contribute 62.57% to sulfate, including zero (0) units in West Virginia. West Virginia was projected to have a 2.49% relative contribution to sulfate at Linville Gorge. One (1) EGU in West Virginia was projected to have a relative contribution greater than 0.5%. EGU reductions are

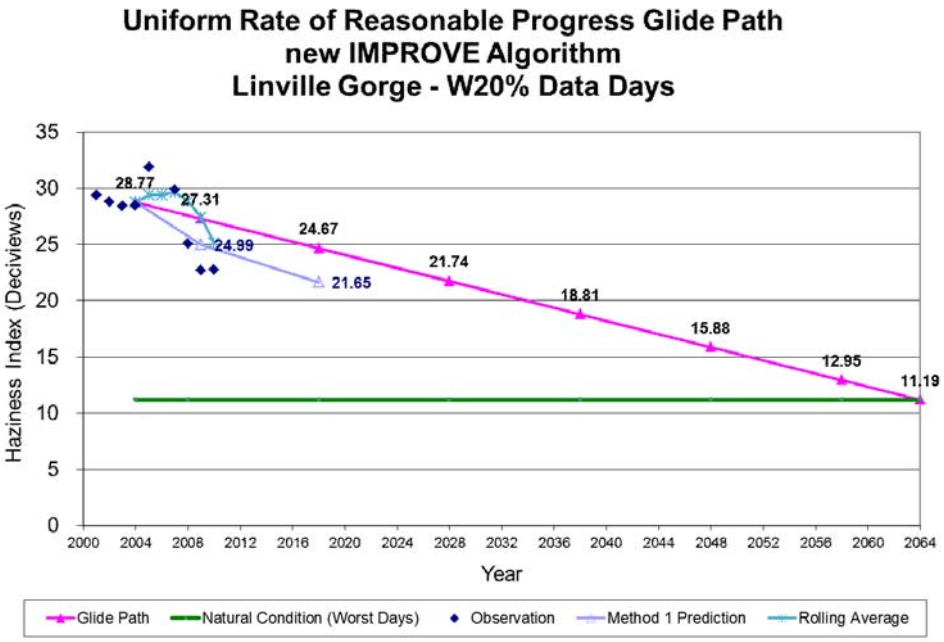


Figure 37. Glide Path for Linville Gorge, NC on 20% Worst Days

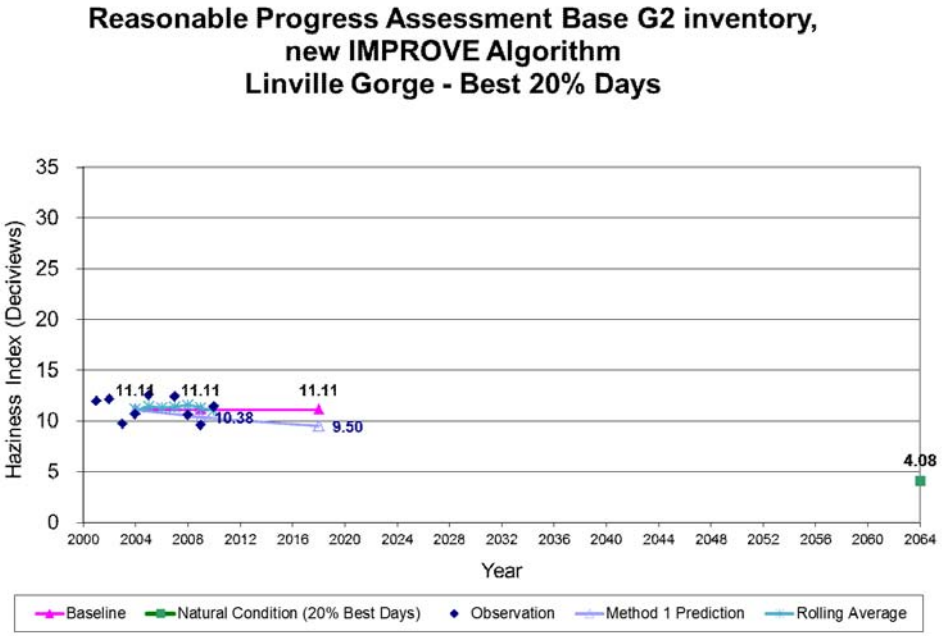


Figure 38. Glide Path for Linville Gorge, NC on 20% Best Days

7.6. Mammoth Cave, KY

7.6.a. Description

Mammoth Cave National Park preserves the cave system and a part of the Green River valley and hilly country of south central Kentucky. This is the world's longest known cave system, with more than 390 miles explored. Early guide Stephen Bishop called the cave a "grand, gloomy and peculiar place," but its vast chambers and complex labyrinths have earned its name - Mammoth.

Figure 39. Mammoth Cave National Park

7.6.b. Assessment

As part of the initial regional haze SIP development, as explained in Section B, VISTAS identified the SO_2 Areas of Influence for Class I areas in the VISTAS region and neighboring regions, including the AoI for Mammoth Cave. The AoI for Mammoth Cave is shown in Figure 40.

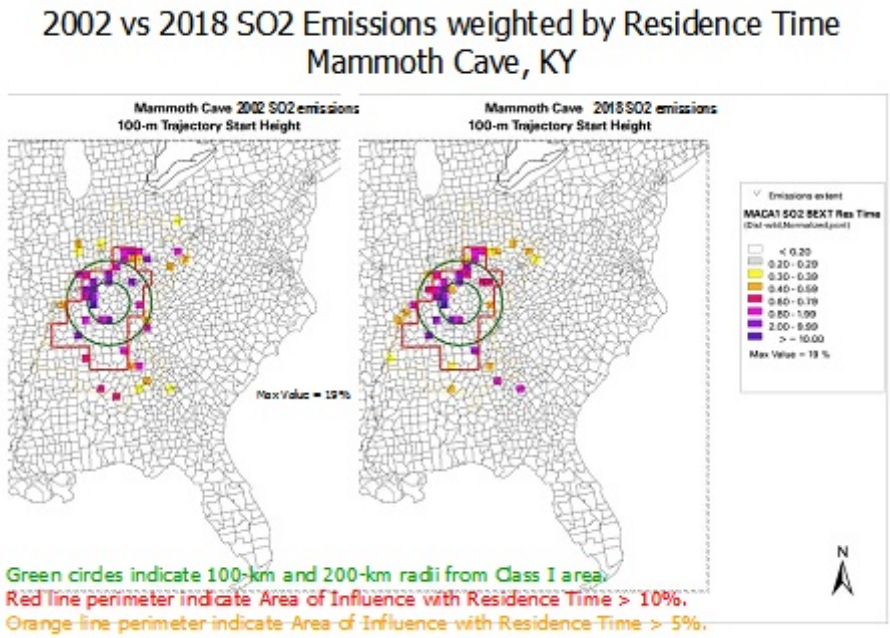


Figure 40. Mammoth Cave, KY 2002 (left) and 2018 (right) SO_2 distance weighted emissions * SO_4 extinction weighted residence time plots

Table 28. 2018 SO_2 Point Source Contribution to Mammoth Cave, KY by State			
State	**Contribution**	**State**	**Contribution**
Alabama	4.33%	Mississippi	0.04%
Georgia	1.79%	Missouri	0.53%
Illinois	0.53%	Ohio	3.95%
Indiana	21.22%	Tennessee	13.46%
Kentucky	53.60%	West Virginia	0.54%

There were 261 units identified within the Area of Influence which were projected to contribute to the sulfate at Mammoth Cave, including five (5) units in West Virginia. Forty-one (41) units have a relative contribution greater than 0.5% and contribute 66.60% to sulfate, including zero (0) units in West Virginia. Nineteen (19) units have relative contribution greater than 1.0% and contribute 52.63% to sulfate, including zero (0) units in West Virginia. West Virginia was projected to have

a 0.54% relative contribution to sulfate at Mammoth Cave. As shown in Figures 41 and 42 Mammoth Cave is on track to achieve RPG by 2018.

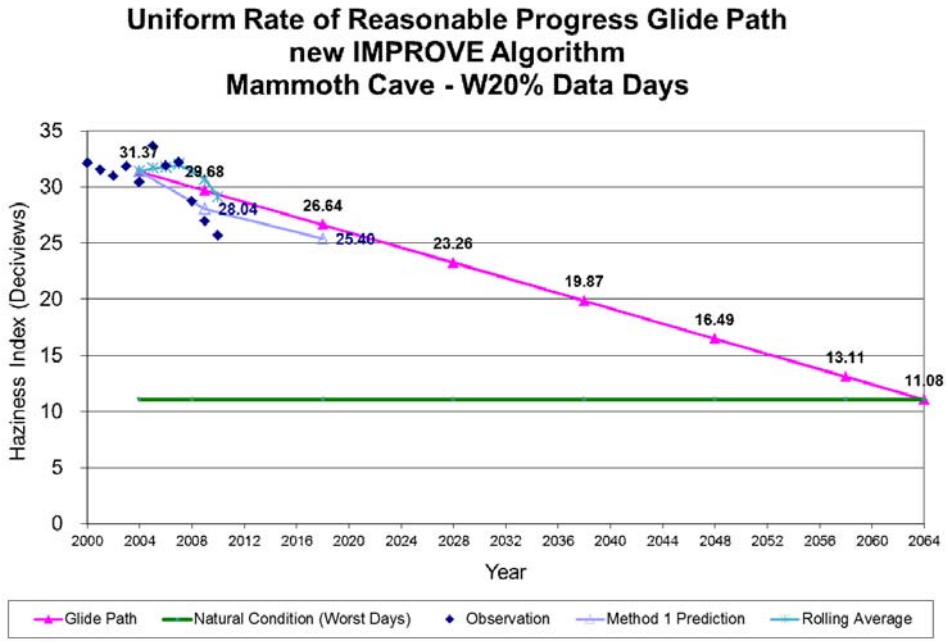


Figure 41. Glide Path for Mammoth Cave, KY on 20% Worst Days

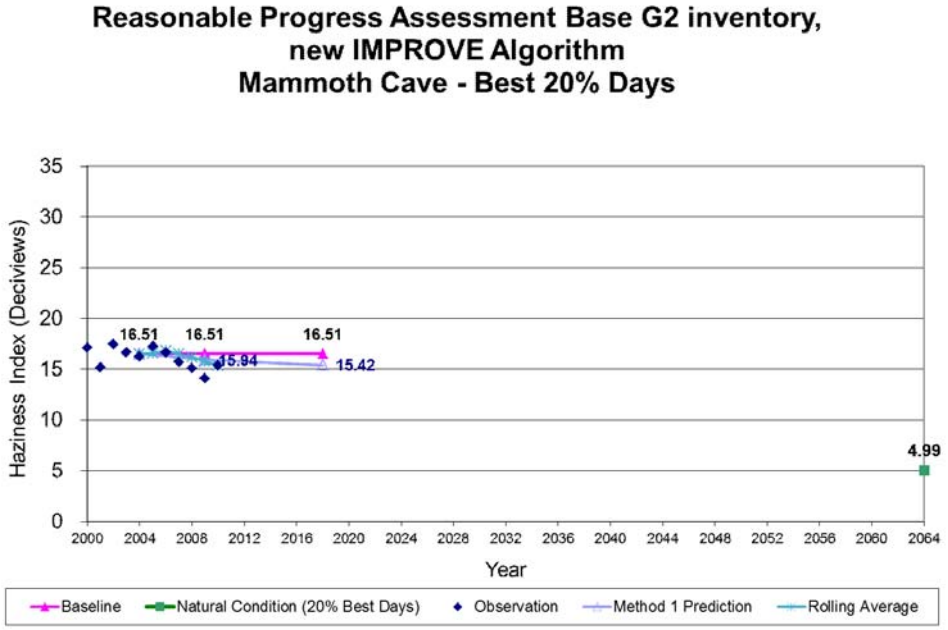


Figure 42. Glide Path for Mammoth Cave, KY on 20% Best Days

7.7. Shenandoah, VA

7.7.a. Description

The 197,000 acres of Shenandoah National Park stretch for 80 miles along the Blue Ridge Mountains, which form the eastern boundary of the Appalachian Range. The valley to the west holds the Shenandoah River and lends its name to the park. Settlement began here in the early 1700s, and early settlers discovered rich soil in the region and outstanding vistas from the Blue Ridge. Shenandoah National Park's "recycled" wilderness demonstrates the recuperative powers of natural processes in eastern deciduous Appalachian forest. Nearly all of the Park's land area, including that now designated as wilderness, was once cleared and inhabited, farmed, logged and burned. The Park was established in 1936 and natural regeneration to the "wilderness" conditions which followed encouraged National Park Service officials to recommend and eventually designate 42% of the Park as wilderness.

Figure 43. Shenandoah National Park

7.7.b. Assessment

As part of the initial regional haze SIP development, as explained in Section B, VISTAS identified the SO_2 Areas of Influence for Class I areas in the VISTAS region and neighboring regions, including the AoI for Shenadoah National Park. The AoI for Shenandoah is shown in Figure 44.

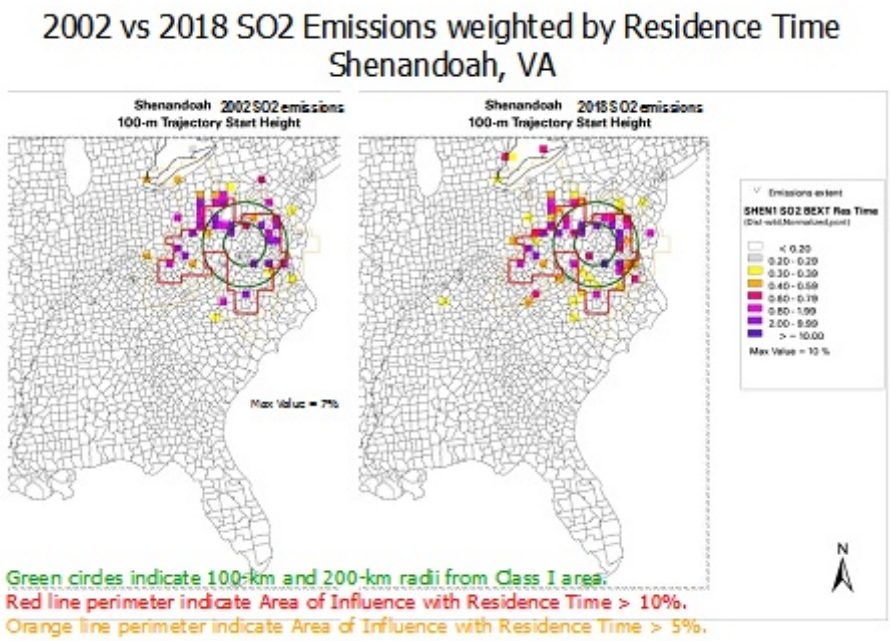


Figure 44. Shenandoah, VA 2002 (left) and 2018 (right) SO_2 distance weighted emissions * SO_4 extinction weighted residence time plots

Table 29. 2018 SO_2 Point Source Contribution to Shenandoah, VA by State			
State	**Relative Contribution**	**State**	**Relative Contribution**
Washington, DC	0.06%	Ohio	4.63%
Delaware	1.46%	Pennsylvania	6.11%
Kentucky	1.10%	Tennessee	0.36%
Maryland	23.99%	Virginia	38.33%
North Carolina	3.97%	West Virginia	19.85%
New York	0.16%		

There were 300 units identified within the Area of Influence which were projected to contribute to the sulfate at Shenandoah, including 69 units in West Virginia. Thirty-nine (39) units have a relative contribution greater than 0.5% and contribute 57.54% to sulfate, including thirteen (13) units in West Virginia, twelve (12) of which are EGUs. Nineteen (19) units have relative contribution greater than 1.0% and contribute 44.29% to sulfate, including seven (7) units in West Virginia, six (6) of which are EGUs. West Virginia was projected to have a 19.85% relative contribution to sulfate at

Shenandoah. Twelve (12) EGUs in West Virginia and Capital Cement were projected to have a relative contribution greater than 0.5%. EGU reductions are discussed in Section C.3, and reductions from Capital Cement are discussed in Sections C.1.5 and C.2.7. As shown in Figures 45 and 46 James River Face is on track to achieve RPG by 2018.

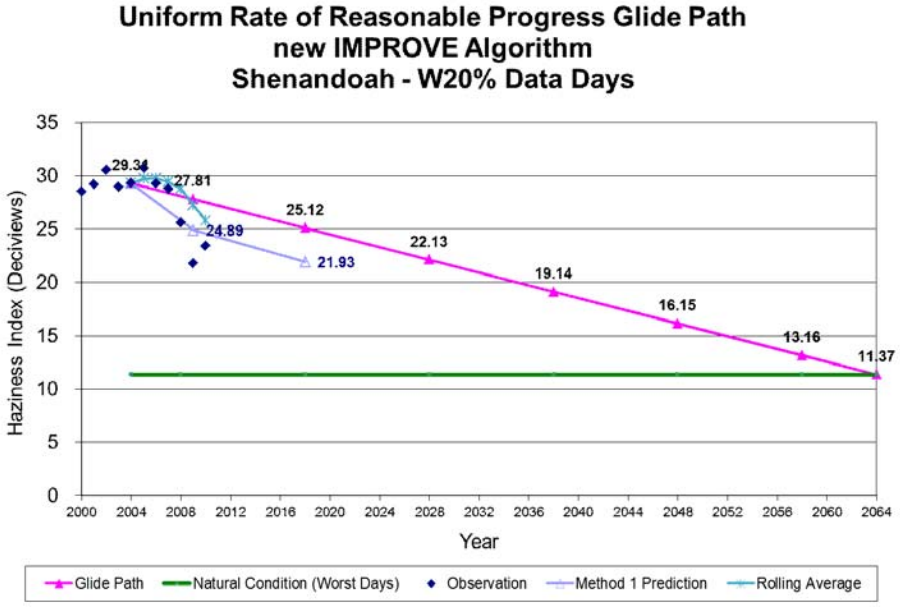


Figure 45. Glide Path for Shenandoah, VA on 20% Worst Days

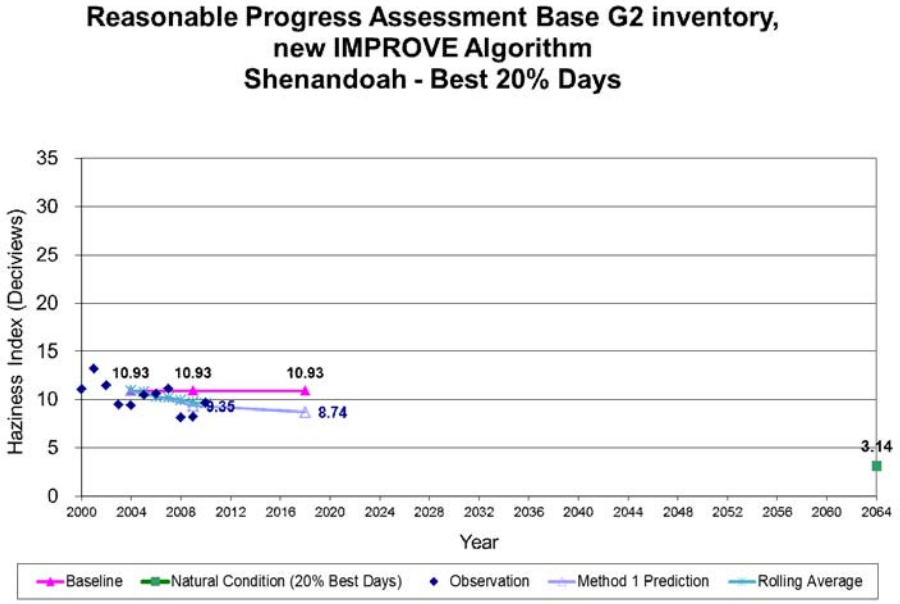


Figure 46: Glide Path for Shenandoah, VA on 20% Best Days

8. ASSESSMENT OF MONITORING STRATEGIES
[40 CFR 51.308(g)(7)]

40 CFR 51.308(g)(7) of the RHR requires:

> A review of the state's visibility monitoring strategy and any modifications to the strategy as necessary.

The primary monitoring network for regional haze, both nationwide and in West Virginia, is the IMPROVE network. Given that IMPROVE monitoring data from 2002-2004 served as the baseline for the regional haze program, the future regional haze monitoring strategy must necessarily be based on, or directly comparable to, IMPROVE. The IMPROVE measurements provide the only long-term record available for tracking visibility improvement or degradation, therefore West Virginia intends to rely on the IMPROVE network for complying with the regional haze monitoring requirement in the Regional Haze Rule.

There is currently one IMPROVE site in West Virginia located at Dolly Sods, which also serves as the surrogate monitoring site for Otter Creek. The IMPROVE measurements are central to West Virginia's regional haze monitoring strategy, and it is difficult to imagine how the objectives listed above could be met without the monitoring provided through IMPROVE. Any reduction in the scope of the IMPROVE network in West Virginia would jeopardize the State's ability to demonstrate reasonable progress toward visibility improvement at Dolly Sods and Otter Creek. In particular, West Virginia's regional haze strategy relies on emission reductions that will result from the CAIR or the CAIR replacement rule and emissions reductions in neighboring States, which will occur at different times and will most likely not be spatially uniform. Continued monitoring at Dolly Sods and representative Class I areas is important to document the air quality impacts of the emissions reductions. Of course monitoring at every Class I area is important, but it is especially important to document the different air quality responses to the emissions reductions at sites like Dolly Sods that are located in complex terrain. Because the current IMPROVE monitor at Dolly Sods represents two unique Class I Federal areas, Dolly Sods and Otter Creek, and a significant component of the contributions at that site are regional, reductions of the IMPROVE network would impact the existing IMPROVE site or any of the nearest regional IMPROVE monitoring sites would eliminate West Virginia's ability to track the progress or effectively plan improvements for the Dolly Sods and Otter Creek Class I areas. Therefore, the DEP urges EPA to maintain support for the IMPROVE network at least equal to current levels.

The IMPROVE network is periodically assessed to optimize the data acquisition versus the required resources. Because the current IMPROVE monitor in West Virginia has an extensive data record that represents a unique airshed, reducing the IMPROVE network by shutting down the monitoring site would significantly impede tracking progress at Dolly Sods and Otter Creek. It is critical to the monitoring strategy that IMPROVE will continue to operate this site, the only one in West Virginia. In the event that the Dolly Sods IMPROVE monitoring site is proposed for elimination, West Virginia, in consultation with EPA and relevant FLMs, will seek to develop an alternative approach for meeting the tracking obligation, perhaps by seeking contingency funding to carry out limited

monitoring or by relying on data from urban monitoring sites to demonstrate trends in the reduction of concentrations of the contributors to visibility impairment. It is unlikely that alternative monitoring approaches will be sufficient to meet the West Virginia or RHR data requirements.

Data produced by the IMPROVE monitoring network will be used as the basis for preparation of the five-year progress reports and the ten-year SIP revisions, each of which relies on analysis of the preceding five years of data. Consequently, the monitoring data from the IMPROVE sites needs to be readily accessible and as up to date as possible. Presumably, IMPROVE will continue to process information from its own measurements at about the same pace and with the same attention to quality as it has shown in the recent past. The VIEWS website has been supported by VISTAS and the other Regional Planning Organizations to provide ready access to the IMPROVE data and data analysis tools. Therefore, West Virginia is encouraging VISTAS and other RPOs to maintain support of VIEWS or an equivalent data management system to facilitate analysis of the IMPROVE and visibility related data.

In addition to the IMPROVE measurements, some ongoing long-term limited monitoring supported by Federal Land Managers provides additional insight into progress toward regional haze goals. West Virginia benefits from the data from these measurements, but is not responsible for the funding decisions to maintain these measurements into the future. Such long-term monitoring includes a Web camera operated by the USDA Forest Service at Dolly Sods.

Moreover, the WVDEP operates a $PM_{2.5}$ network of the filter-based Federal reference method monitors and filter-based speciation monitors. A map of the various locations around the State is included in Figure 47. These $PM_{2.5}$ measurements help the WVDEP characterize air pollution levels in areas across the state, and therefore aid in the analysis of visibility improvement in and near the Class I areas.

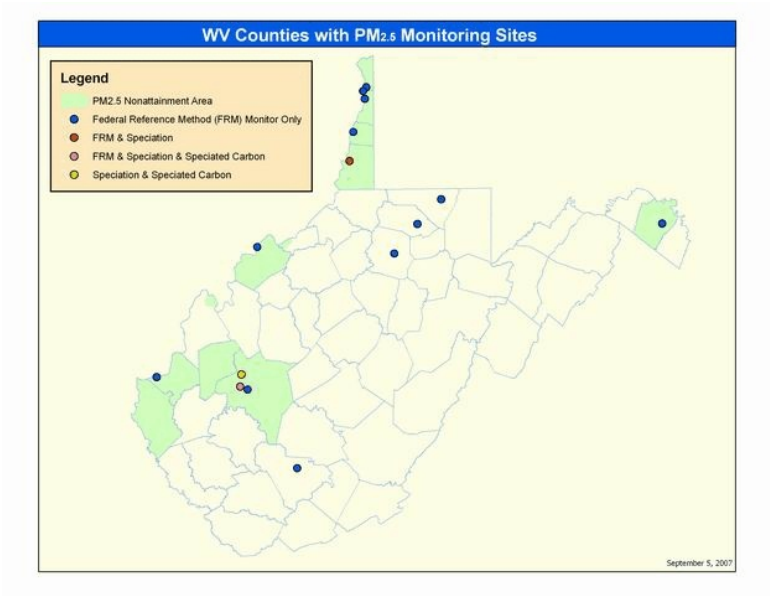


Figure 47. WV $PM_{2.5}$ Monitoring Network

D. ADEQUACY OF THE EXISTING SIP
[40 CFR51.308(h)]

1. REQUIREMENT TO DETERMINE THE ADEQUACY OF THE EXISTING SIP

40 CFR 51.308(h) of the RHR states:

> (h) *Determination of the adequacy of existing implementation plan.* At the same time the State is required to submit any 5-year progress report to EPA in accordance with paragraph (g) of this section, the State must also take one of the following actions based upon the information presented in the progress report:
>
> > (1) If the State determines that the existing implementation plan requires no further substantive revision at this time in order to achieve established goals for visibility improvement and emissions reductions, the State must provide to the Administrator a negative declaration that further revision of the existing implementation plan is not needed at this time.
> >
> > (2) If the State determines that the implementation plan may be inadequate to ensure reasonable progress due to emissions from sources in another State(s) which participated in a regional haze planning process, the State must provide notification to the Administrator and to the other State(s) which participated in the regional planning process with the States. The State must also collaborate with the other State(s) through the regional haze planning process for the purpose of developing additional strategies to address the plan's deficiencies.
> >
> > (3) Where the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another country, the State shall provide notification, along with available information, to the Administrator.
> >
> > (4) Where the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions form sources within the State, the State shall revise its implementation plan to address the plan's deficiencies within one year.

2. DETERMINATION OF IMPLEMENTATION PLAN ADEQUACY

Based on the options above and the evidence presented herein, the DEP is proposing a negative declaration to the EPA Administrator, specifying that no additional controls are necessary during this, the first five-year progress report period. Therefore, no further revision of the existing West Virginia implementation plan is needed.

In keeping with the EPA's recommendations related to consultation, the DEP enlisted the support of appropriate state, local and tribal air pollution agencies, as well as the corresponding FLMs to formulate this report. As part of this commitment, the DEP made an advanced, draft copy of this report available to the aforementioned agencies and sought their input. Comments received, along with the DEP's responses can be found in Appendix B – Interagency Consultation. Those comments seen as germane were taken into account in developing this progress report.

In addition, the DEP also published a Notice of Public Hearing and Comment Period in the *West Virginia State Register* and the *Charleston Gazette* on March 22, 2013, providing a 30-day public comment period. A public hearing, if requested, will be held on April 30, 2013. A copy of the public notice can be found in Appendix C – Public Participation.

The DEP commits to continued consultation among the states and FLMs as it relates to any SIP revisions and/or the implementation of other programs having the potential to contribute to visibility impairment. The State anticipates that this will occur in much the same fashion as did the pre-hearing meetings, comments, and responses, as required by 40 CFR 51.308(i)(3) and included in Appendix B.