United States Department of the Interior

NATIONAL PARK SERVICE
Air Resources Division
P.O. Box 25287
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TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

N3615 (2350)

February 27, 2012

Cristina Fernandez, Associate Director
Office of Air Program Planning
Mailcode 3AP30
U.S. Environmental Protection Agency Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103

EPA Docket ID: EPA-R03-OAR-2012-0002

Dear Ms. Fernandez:

The National Park Service (NPS) has reviewed the Environmental Protection Agency's (EPA's) proposed "Approval and Promulgation of Air Quality Implementation Plans; Commonwealth of Pennsylvania; Regional Haze State Implementation Plan." We are concerned that EPA Region 3 and Pennsylvania have not been receptive to concerns that we raised in our August 2010 comments on the draft plan. Our continuing concerns are discussed in the enclosed technical comments.

We appreciate the opportunity to work closely with the Pennsylvania Department of Environmental Protection and EPA Region 3 to make progress toward achieving natural visibility conditions at our National Parks and Wilderness Areas. For further information regarding our comments, please contact Don Shepherd at (303) 969-2075.

Sincerely,

Patricia Brewer Jr

Susan Johnson
Chief, Policy, Planning and Permit Review Branch

Enclosure

cc:
Joyce E. Epps, Director
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National Park Service Comments on Pennsylvania Regional Haze Plan
February 27, 2012

Reasonable Progress Goals

We are concerned with EPA's proposal to approve Pennsylvania's long term strategy to meet the reasonable progress goals that were established by the northeastern and mid-Atlantic States in the MANE-VU Regional Planning Organization. These reasonable progress goals were based on air quality modeling of the visibility improvements expected by 2018 under assumed emissions controls in the MANE-VU "Ask". To be approved, these emissions controls are required to be enforceable. EPA is proposing that even though Pennsylvania is not expecting to achieve the emissions reductions modeled in the MANE-VU "Ask", EPA will approve Pennsylvania's long-term strategy. This action is inconsistent with actions of other states and EPA Regions that are assuring that all controls included in the reasonable progress goals are enforceable.

Best Available Retrofit Technology (BART)

Cumulative Impact:
In our August 2010 comments on Pennsylvania's draft BART determinations, we recommended that Pennsylvania Department of Environmental Protection (PA DEP) consider the cumulative visibility impact at multiple Class I areas, not just the impact at the single most impacted Class I area, in evaluating potential control alternatives. PA DEP's responses to our comments[1] excerpted below point to the lack of consistency in EPA guidance to states and in EPA application of its own guidance in approving state plans.

> **DEP response:** The Department did not establish or utilize bright line thresholds for cost or for visibility improvement in making BART determinations for the sources subject to BART. The Department considered all of the BART Guideline factors, and determined that a BART source analysis resulting in significant visibility improvement from controls would consequently justify higher cost controls. The Department maintains that a low $/ton control cost should not supersede an excessively high cost of visibility improvement. The Department does not believe that requiring additional controls on a BART source based solely on a high cost of visibility improvement for very small visibility improvement, albeit a low $/ton control cost, is justified or appropriate.
>
> The EPA's *Guidelines for BART Determinations, Final Rule* (40 CFR Part 51, July 6, 2005) does not stipulate a requirement for a "cumulative" impact analysis from one BART source on multiple Class I areas. Therefore, and as stated by the commentator, since EPA has provided no guidance on the issue of assessing visibility benefits that may result in multiple Class I areas when emissions are

[1] EPA-R03-OAR-2012-0002-0022 Ap AA

reduced from a given BART source, the Department maintains that such an analysis is unwarranted.

In its January 21, 2011 letter to the Nebraska Department of Environmental Quality, EPA stated that "a $/dv analysis is likely to be less meaningful if the analysis does not take into account the visibility impacts at multiple Class 1 areas or ignores the total improvement (i.e., the frequency, magnitude, and duration of the modeled changes in visibility)."

DEP Response: The Department also maintains that requiring additional controls on a BART source to provide very small visibility improvements at multiple Class I areas due to an apparent low $/deciview visibility improvement cost is nether justified or appropriate. The summation of very small delta deciviews serves the mathematical purpose of increasing the delta deciview value with respect to the $/delta deciview equation and thereby lowering the apparent cost of controls per delta deciview, while not providing any significant visibility improvement to any of the affected Class I areas. The examples of BART source impacts described in the comment are examples of large deciview visibility impacts at many Class I Areas within 300 kilometers of the Wyoming and Oregon BART sources. Very small delta deciview values from a BART source should not be summed to determine the cumulative effect on all lesser affected Class 1 areas. EPA's BART guidelines recommend analyzing visibility improvement for the highest impacted Class I area, with the assumption that any improvement in the worse impacted area would result in improvement in the lesser impacted areas. The Department applied the guidelines for the determination of BART for the affected sources.

In evaluating the benefits of adding BART controls at the Four Corners Power plant[2] and the San Juan Generating Station[3], EPA added all visibility improvements at all Class 1 areas within 300 km of those power plants.

DEP Response: The Department agrees that the cost per-deciview of visibility improvement is the most-common and most-useful parameter for assessing the cost-effectiveness of strategies to improve visibility in Class I areas, because the Regional Haze program was designed to improve visibility in Class I areas, which is measured in deciviews. However, the Department did not establish or utilize bright line thresholds for cost or for visibility improvement in making BART determinations. The Department considered all of the BART Guideline factors, and determined that a BART source analysis resulting in *significant visibility improvement* from controls would consequently justify higher cost controls. It should also be noted that the $/deciview cost in the example provided in the comment is an incremental cost effectiveness rather than the average cost effectiveness.

[2] EPA-R09-OAR-2010-0683
[3] EPA-R06-OAR-2010-0846-003

The BART Guidelines explicitly advise against applying a perceptibility test to determine if a control measure is appropriate.

None of PA DEP's BART determinations resulted in a recommendation that BART controls be implemented on any emission unit. PA DEP did not establish *any* objective criteria for determining the acceptability of a given control technology's cost effectiveness or cost of visibility improvement. The above PADEP statement would seem to imply that in the absence of *absolute* bright line thresholds, given all the BART sources in the State, visibility improvement at the *relatively* lowest cost facilities would result in BART controls at some subset of the BART-eligible units.

Cement Plants

In response to our August 2010 comments on Pennsylvania's BART-eligible cement plants, PA DEP cited state regulations that require summertime (May-Sep) NO_X controls as supporting no additional control requirements for BART. Ammonium nitrate is dependent on colder temperatures and the greatest contributions of NO_X to visibility impairment occur in the colder months. Therefore summertime NO_X controls will not be effective in reducing wintertime NO_3 unless these controls are required year round. We recommend that BART for Pennsylvania cement plants is year-round operation of the NO_X controls already required by state regulation for seasonal operation.

SNCR has become the "presumptive" norm for controlling NO_X from cement kilns year-round,[4] and EPA should require a minimum of 35% NO_X reduction on a 30-day rolling average basis. As shown in the table below, many cement plants nationwide are controlling NO_X from their kilns in their BART determinations.

Pensylvania Company	BART Unit	Kiln Type	SNCR Reduction %	SNCR Cost /ton	SNCR Cost /dv	BART
Essroc Cement	Kiln #5	long, wet	35%	$ 1,014	$ 7,494,026	Seasonal NO_X controls
Lehigh Cement/York		white cement	35%	$ 1,505	$ 10,606,000	Seasonal NO_X controls
Lehigh Cement	Kiln	dry preheater	60%	$	$	Seasonal NO_X

[4] Excerpts from EPA's BART Guidelines: For NOx, we proposed that sources currently using controls such as SCRs to reduce NOx emissions during part of the year should be required to operate those controls year-round. For EGUs currently using controls such as SCRs or SNCRs to reduce NOx during part of the year, we are establishing a presumption that use of these same controls year-round is BART. For NOx, for those large EGUs that have already installed selective catalytic reduction (SCR) or selective non-catalytic reduction (SNCR) during the ozone season, States should require the same controls for BART. However, those controls should be required to operate year-round for BART. For sources currently using SCR or SNCR for part of the year, states should presume that the use of those same controls year-round is highly cost-effective. For power plants with a generating capacity in excess of 750 MW currently using selective catalytic reduction (SCR) or selective non-catalytic reduction (SNCR) for part of the year, you should presume that use of those same controls year-round is BART. For other sources currently using SCR or SNCR to reduce NOx emissions during part of the year, you should carefully consider requiring the use of these controls year-round as the additional costs of operating the equipment throughout the year would be relatively modest.

Company/Evansville	#1			627	8,094,250	controls
Lehigh Cement Company/Evansville	Kiln #2	dry preheater	60%	$ 627	$ 8,094,250	Seasonal NO_X controls
Lafarge Corporation/Whitehall	Kiln #2	dry preheater	25%	$ 1,804	$ 27,177,065	Seasonal NO_X controls
Lafarge Corporation/Whitehall	Kiln #3	dry preheater	25%	$ 2,144	$ 24,336,753	Seasonal NO_X controls
Cemex/Wampum	Kiln #3	long, dry kiln	35%	$ 1,014	$ 4,678,401	Seasonal NO_X controls
Keystone Cement	Kiln #2	long, wet kiln	35%	$ 1,014	$ 23,431,248	Seasonal NO_X controls
Other States						
Ash Grove Cement		long, wet kiln				LNB&SNCR
CEMEX		preheater/precalciner	48%	$ 1,934	$ 4,306,937	SNCR
Holcim Cement		preheater/precalciner	45%	$ 2,293	$ 8,750,000	SNCR
Holcim Cement		long, wet kiln	30%			SNCR
LaFarge North America (cement)	Kiln #19	long, dry process kilns	35%	$ 731		SNCR
LaFarge North America (cement)	Kiln #20	long, dry process kilns	35%	$ 731		SNCR
LaFarge North America (cement)	Kiln #21	long, dry process kilns	35%	$ 731		SNCR
LaFarge North America (cement)	Kiln #22	long, dry process kilns	40%	$ 498		SNCR
LaFarge North America (cement)	Kiln #23	long, dry process kilns	40%	$ 498		SNCR
St. Mary's Cement		preheater/precalciner	40%	$ 739		EPA SNCR
LaFarge North America (cement)		wet process kiln	40%	$ 4,190		SNCR or mid-kiln firing of whole tires

P.H. Glatfelter Company

P.H. Glatfelter (Glatfelter) operates a pulp and paper mill in Spring Grove, PA, 156 km northwest of Shenandoah National Park (NP), a Class I area administered by the National Park Service (NPS).[5] Power Boiler #1 (PB#1) is a front-wall-fired Riley Stoker boiler that burns pulverized coal and is BART-eligible.[6]

[5] Three other Class I areas are within 300 km of Glatfelter:

- Brigantine National Wildlife Refuge209 km to the east-southeast managed by the US Fish & Wildlife Service
- Dolly Sods National Wilderness Area 232 km to the west-southwest managed by the US Forest Service
- Otter Creek National Wilderness Area 252 km to the west-southwest

[6] In 2006 Glatfelter was subject to a retroactive PSD action for modifications to its power plant. As part of that process, 2004 power boiler SO_2 emissions (tpy) were presented: PB#1 = 3,430; PB#3 = 155; PB#4 = 4,147; PB #5 = 393

Economic Impacts of Wet Scrubbing

PA DEP estimated a wet-scrubbing cost-effectiveness of $1,667/ton of SO_2 removed from PB#1. We believe that PA DEP has overestimated the cost of SO_2 scrubbing.

In Glatfelter's 2007 BART report, it estimated that a high-pressure-drop Venturi wet scrubber[7] using a caustic scrubbing medium would remove 95% (3,764 tons/yr) of the uncontrolled SO_2 from PB#1 at an annual cost of $4,913,017 for a cost-effectiveness of $1,305/ton.

Based upon consultations with PA DEP, Glatfelter provided two revisions to their cost data and the basis of their cost calculations. Their most current cost analysis breakdown for the wet scrubber is in Table 4 of the third version of their cost analysis, which was received by NPS on 7/28/10. In those revisions, Glatfelter and PA DEP estimated that a high-pressure-drop Venturi wet scrubber using a lime-based[8] scrubbing medium would remove 90% (3,225 tons/yr) of the uncontrolled SO_2 from PB#1 at an annual cost of $5,375,398 for a cost-effectiveness of $1,667/ton.

We advised[9] PA DEP that they had overestimated the costs of wet scrubbing SO_2 for the reasons discussed below. The over-estimation resulted from several deviations from the OAQPS Control Cost Manual approach:

- PA DEP did not follow the Cost Manual in estimating installation costs. The Cost Manual recommends multiplying the Purchased Equipment Cost (PEC) by 0.85 to estimate the Direct Installation Cost (DIC). Instead, PA DEP multiplied the PEC by a factor of 1.65.
- PA DEP assumed a 10% interest rate instead of the 7% rate recommended by the Cost Manual.
- PA DEP estimated operating labor time at 3 hours/shift versus the 0.5 hours/shift estimated by the Cost Manual.
- PA DEP estimated maintenance labor time at 1 hour/shift versus the 0.5 hours/shift estimated by the Cost Manual.
- The solid waste generation rate used by PA DEP is double the 8/17/2007 vendor estimate.

As a result of these deviations from the Cost Manual, PA DEP estimated a Total Annual Cost (TAC) of $5.4 million and cost-effectiveness = $1,667/ton of SO_2 removed.

Regarding DIC, PA DEP explained (in its Response to Comments in Appendix AA) that "a wall would have to be demolished and an addition would have to be built. Additionally, an asbestos abatement program would be required to allow for the installation of FGD. The facility added these costs to the Direct Installation calculation by using a factor of 1.65 instead of 0.85. The Department visited the facility and agrees that these additional costs will be incurred and should be accounted for as additional direct installation costs." However, it appears that the costs to which PA DEP refers are

[7] Glatfelter chose the Venturi scrubber design to avoid the cost of add-on particulate /mist controls.
[8] to avoid wastewater treatment issues associated with caustic scrubbing
[9] our 8/02/10 letter to PA DEP

associated with the $4 million demolition and asbestos abatement expenses, not the "site preparation" costs.[10]

In August of 2007, Glatfelter provided updated estimates (in 2007$) for scrubber costs which included $9,815,256 for site preparation (compared to $4 million previously), along with a breakout of the $4 million demolition and asbestos abatement expenses. Glatfelter explained[11] that the "non-demolition direct installation estimate is based on the **assumption that total capital investment typically equals three to four times the purchased equipment costs** for complex jobs. In this case, the demolition of the Old Recovery facility was considered extraordinary and therefore treated as an additional cost; the **multiplier** was reduced to three to adjust for the different treatment of the demolition. In summary, total purchased equipment costs were estimated to be $5,948,640. The total cost associated with installing all equipment was estimated to be $11,897,280 (2X purchased equipment cost). Demolition of Old Recovery to make room for the equipment was estimated to be $4,000,000. The total capital investment is $21,845,920, the sum of the three previous numbers."

It is clear from the preceding statement that Glatfelter used a factored approach for estimating DIC, just as the Cost Manual does. However, where the Cost Manual assumes that DIC (excluding site preparation/demolition) is 85% of the Purchased Equipment Cost (PEC), Glatfelter assumed a much higher percentage (165%). While we can accept Glatfelter's cost breakdown of the $4 million demolition and asbestos abatement cost, we believe that Glatfelter's use of such a different multiplier to estimate TIC has not been properly justified.

Using the Cost Manual approach to estimate the cost of adding a 90% efficient wet scrubber to Power Boiler #1, and including the increased Direct Installation Cost recommended by PA DEP, the resulting "corrected" cost-effectiveness is $1,425/ton.

A straightforward application of the Cost Manual yields $1,204/ton. Our results are tabulated below, and supported by the Xcel workbooks (**attached electronically**).

	PA DEP	Corrected PA DEP	Cost Manual
Emission reduction (TPY)	3225	3225	3225
Total annualized cost ($/yr)	$5,375,398	$4,595,750	$3,882,890
Cost/ton removed ($/T)	$1,667	$1,425	$1,204

Degree of Visibility Improvement

[10] In Glatfelter's 2007 cost estimates for adding a wet scrubber, Direct Installation Cost is $8 million (in 2006$), broken down as:

- Site preparation, excavation, drains, basin, curbs, foundations, anchor bolts, ID fan, new stack, heat tracing, ash handling, piping, valves, semi-dry scrubber and baghouse system [we assume this is inadvertent], misc. = $4 million. (It is our understanding is that the new stack allows Glatfelter to avoid scrubbing the emissions from the other power boilers (#3 & #4) currently on a common stack with PB#1.)
- Demolition of recovery boiler building, including asbestos abatement = $4 million.

[11] 8/17/07 email from Jeff Hamon, Asst. Environmental Director, Glatfelter to Dan Husted, PA EP

PA DEP estimated that the 98th percentile deciview improvement expected by the installation of a wet scrubber system on the PB#1 was 0.219 dv. NPS commented that, in addition to improving visibility at Shenandoah National Park (the Class I area used by PA DEP), a similar visibility improvement was modeled at Brigantine Wildlife Refuge. (PA DEP did not model additional visibility improvements at Dolly Sods and Otter Creek Wilderness Areas which had visibility impacts about half of those at Shenandoah and Brigantine.) The cumulative[12] benefits of reducing SO_2 from Power Boiler #1 would be 0.44 dv at Shenandoah and Brigantine, with additional benefits at Dolly Sods and Otter Creek.

Power Boiler #1

Class I Area	Control	Change in 98th Percentile Impact (dv)			
		2001	2002	2003	Average
Shenandoah	90% SO2	0.217	0.213	0.226	0.219
Brigantine		0.303	0.142	0.208	0.218
Total					0.436

The cost in terms of dollars per deciview at this facility for the installation of the wet scrubber was calculated by PA DEP to be $24,545,196/dv.

The Corrected PA DEP cost estimate yields $21million/dv at Shenandoah NP. When one considers the cumulative benefits of improving visibility at the four Class I areas modeled by PA DEP, the cost-effectiveness drops below $10 million/dv, which is less than the $18 - $21 million/dv average cost-effectiveness for all of the controls we have seen proposed as BART nationwide.

A straightforward application of the EPA Control Cost Manual produces $18 million/dv at Shenandoah NP and less than $9 million/dv on a cumulative basis.

Our results are tabulated below.

	PA DEP	Corrected PA DEP	Cost Manual	
Total annualized cost ($/yr)	$5,375,398	$4,595,750	$3,882,890	
98% Visibility Improvement =	0.219	0.219	0.219	at Shenandoah
Cost/deciview =	$24,545,196	$20,985,159	$17,730,093	at Shenandoah
98% Visibility Improvement =	0.437	0.437	0.437	at Shenandoah + Brigantine
Cumulative Cost/deciview =	$12,300,682	$10,516,590	$8,885,333	at Shenandoah + Brigantine

[12] In our 8/02/10 letter to PA DEP, we commented that, "We believe that it is appropriate to consider both the degree of visibility improvement in a given Class I area as well as the cumulative effects of improving visibility across all of the Class I areas affected." In its January 21, 2011 letter to the Nebraska Department of Environmental Quality, EPA stated that "a $/dv analysis is likely to be less meaningful if the analysis does not take into account the visibility impacts at multiple Class I areas or ignores the total improvement (i.e., the frequency, magnitude, and duration of the modeled changes in visibility)."

Level Playing Field

While we believe that 95% SO_2 reduction is feasible, the table below shows that, with the exception of the MeadWestvaco mill in VA,[13] proposed BART for coal-fired power boilers at other pulp and paper mills is 90% to 96%.

State	Company	Facility	Source	Control Technology	SO_2 % Reduction	SO_2 Limits
MD	New Page/Westvaco	Luke Paper	Power Boiler No. 25	BART: Spray Dryer Absorber or a Circulating Dry Scrubber	90%	
VA	MeadWestvaco	Covington	Power Boiler #9	BART: upgrade existing wet caustic scrubbers which control SO2 emissions from all 4 power house boilers	additional 20% SO_2 reduction	1831 lb/hr (annual avg.) demonstrated daily; 8020 tons/yr (12-month rolling total)
VA	MeadWestvaco	Covington	Power Boiler #9	Reasonable Progress determination that additional upgrades could be made to the existing scrubber system by 2015 by adding virgin caustic to the scrubber liquid	additional 15% SO_2 reduction	1556 lb/hr (annual avg.) demonstrated daily; 6817 tons/yr (12-month rolling total)
VA	Georgia Pacific	Big Island	#4 Power Boiler	BART: caustic scrubber	design control efficiency of 90 percent	Annual SO_2 emissions will be limited to 219 tpy
WI	Georgia Pacific	Green Bay	Power Boilers B-26 and B-27	The final BART determination for SO_2 reflects fuel switching of petroleum coke from BART boilers B26 and B27, followed by circulating bed dry scrubbing technology at 93% control.	Overall SO_2 control efficiency, based on combination of fuel switching and dry scrubber control at 93%, is 95.8% for B26 and 93.8% for B27.	268 tons/30-day rolling average; 2,340 tpy

BART Determination

PA DEP: "The cost effectiveness of installing a wet scrubber system for SO2 control on Number 1 Power Boiler, taking into account visibility improvement, was $24,545,196/dv…Based on the five factor analysis, the impact of this facility does not warrant additional control."

NPS: PA DEP appears to have based its BART determination solely upon cost/deciview. Using the Cost Manual approach to estimate the cost of adding a 90% efficient wet scrubber to Power Boiler #1, the resulting cost-effectiveness at Shenandoah National Park is $18 million/dv is which is consistent with the $18 - $21 million/dv average cost-effectiveness for all of the controls we have seen proposed as BART for EGUs nationwide. When one considers the cumulative benefits of improving visibility at the four Class I areas modeled by PA DEP, the cost-effectiveness drops below $9 million/dv. (Using the PA DEP "uncorrected" and "corrected" estimates yields $11 - $12 million/dv.)

Conclusions & Recommendations

- PA DEP did not follow the EPA Control Cost Manual and has overestimated the costs of wet scrubbing SO_2.

[13] We are submitting comments to EPA supporting 90% SO_2 control at this facility.

- PA DEP based its BART determination upon cost/deciview of improvement, but did not consider cumulative benefits, as EPA has advised.
- The cost-effectiveness of adding a 90% efficient SO_2 scrubber is reasonable in terms of cost/ton and cost/deciview.
- Other pulp and paper mills with coal-fired power boilers are installing SO_2 scrubbers under the BART program.
- We conclude that addition of a 90% efficient wet scrubber to Power Boiler #1 is BART.